

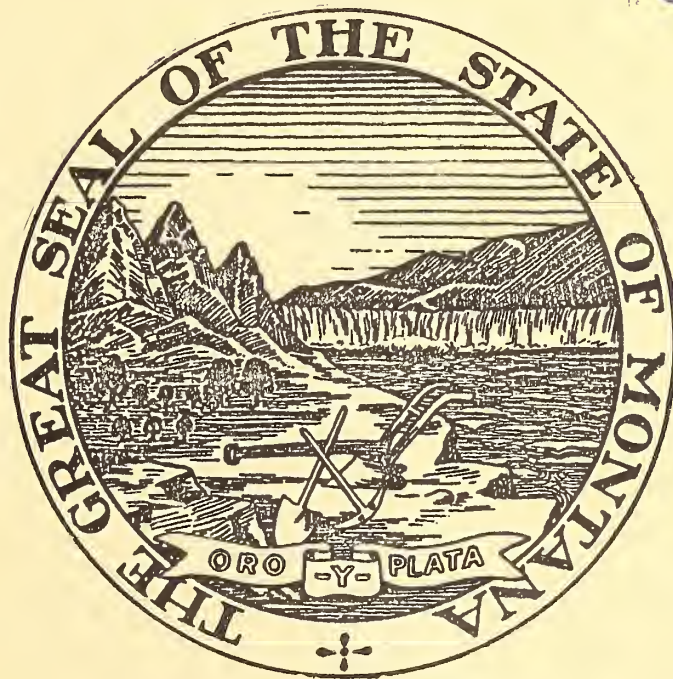
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STATE DOCUMENTS

STANDARD DRAWINGS

JUN 20 1974

1974 EDITION



SUPPLEMENTAL
TO
STANDARD SPECIFICATIONS
FOR
ROAD AND BRIDGE CONSTRUCTION

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STANDARD DRAWINGS FOR HIGHWAY CONSTRUCTION

These Standard Drawings which are supplementary to the Standard Specifications become effective July 1, 1974.

In the future when revised drawings are sent, they will become effective on the date shown thereon and the superseded drawings should be retained until no longer applicable.

New drawings issued will become effective on the date shown thereon.

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SYMBOLS & ABBREVIATIONS

TITLE SHEET

	PRIMARY ROAD*
	PRIMITIVE ROAD
	PROPOSED ROAD
	GRADED ROAD
	GRAVELED ROAD
	PAVED ROAD
	FEDERAL AID ROUTING (On Existing Road)
	FEDERAL AID ROUTING (Non-existing Road)
	INTERCHANGE
	STRUCTURE
	FREE FERRY
	TOLL FERRY
	HIGHWAY TUNNEL
	PASS
	RAILROAD
	RESERVATION LINE
	STATE & NATIONAL LINE
	COUNTY LINE
	TOWNSHIP & SECTION LINE
	U. S. HIGHWAY
	STATE HIGHWAY
	CITY OR TOWN
	AIR FIELD
	DAM
	BUILDING

Primary roads are 08 inch wide. All others are 05 inch wide.

PLAN

	STATE & NATIONAL LINE
	COUNTY LINE
	CITY OR TOWN BOUNDARIES
	TOWNSHIP LINE
	SECTION LINE (Showing corner solid if found—open if not found)
	HIGHWAY RIGHT-OF-WAY
	RAILROAD RIGHT-OF-WAY
	BASE OR SURVEY LINE
	OF STAKED LINE WHEN A PROJECTION IS MADE
	RAILROAD
	TRAVELED WAY
	LEVEE OR DYKE
	RETAINING WALL
	RIPRAP
	CONCRETE SIDEWALK
	CONCRETE CURB
	FENCE LINE
	CATTLE GUARD
	SNOW FENCE
	TREE OR BUSH
	SMALL DRAINAGE
	LARGE DRAINAGE
	RESERVOIR WITH DAM
	LAKE
	MARSH, SWAMP
	BLUFFS OR CLIFFS
	GRAVEL PIT
	CULVERT WITH HEADWALL (In Place)
	CULVERT WITHOUT HEADWALL (In Place)
	NEW CULVERT OR EMBANKMENT PROTECTOR
	DROP INLET, MEDIAN INLET OR CATCH BASIN
	POWER CABLE
	TELEPHONE OR TELEGRAPH CABLE
	WATER LINE
	STORM SEWER
	SANITARY SEWER
	NATURAL GAS LINE
	GASOLINE OR OIL LINE
	TELEGRAPH POLE
	TELEPHONE POLE
	POWER POLE
	TROLLEY POLE
	LIGHT POLE
	GUY POLE
	GUY WIRE & ANCHOR

PLAN

	OIL OR GAS WELL
	TANKS
	MANHOLE (Label as to type or service)
	HYDRANT
	WATER WELL
	SCALES
	PROJECT MARKER
	STATION MARKER
	R/W MONUMENT
	CENTERLINE
	DEFLECTION ANGLE
	DEFLECTION ANGLE (Circular Curve)
	DEFLECTION ANGLE OF ONE SPIRAL
	PROPERTY LINE
	NORTH ARROW
	DITCH BLOCK

ABBREVIATIONS

ADD EXC	ADDITIONAL EXCAVATION
A D T	AVERAGE DAILY TRAFFIC
AGG	AGGREGATE
AH	AHEAD
APP	APPROACH
APPL	APPLICATION
APPROX	APPROXIMATE
ASPH	ASPHALT
AV	AVERAGE
BBLs	BARRELS
BEG	BEGIN
B E	BRIDGE END
BIT	BITUMINOUS or BITUMEN
BK	BACK or BANK
BLDG	BUILDING
BLK	BLOCK
B M	BENCH MARK
BDT	BOTTOM
BR	BRIDGE
B R	BASE of RAIL
B S T	BITUMINOUS SURFACE TREATMENT
C	CUT
C & G	CURB & GUTTER
C/A	CONTRD of ACCESS
C A P	CORRUGATED ALUMINUM PIPE
CEM	CEMENT
CH	CHANNEL
CH CH	CHANNEL CHANGE
CL	CLASS or CLEARANCE
CO	COUNTY or COMPANY
COMP	COMPACTION
CDNC	CONCRETE
CONN	CONNECTION
CONST	CONSTRUCTION
COR	CORNER
COV	COVER
CR	CRUSHED or CREEK
CHS	COURSE
C S	CURVE to SPIRAL
C S P	CORRUGATED STEEL PIPE
C S P A	CORRUGATED STEEL PIPE ARCH
CTR	CENTER
CULV	CULVERT
C Y	CUBIC YARD
D	DEGREE of CURVATURE or DISTRIBUTION of TRAFFIC
D C	DEGREE of CURVATURE (with spirals)
DET	DETOUR
DH V	DESIGN HOURLY VOLUME

D I	DROP INLET	PERF	PERFORATED
DR	DRAIN	P I	POINT of INTERSECTION
DT	DITCH	PL	PLACE
DWG	DRAWING	PMB	PLANT MIX BASE
E	EAST	PMS	PLANT MIX SURFACING
E B	EASTBOUND	P D C	POINT on CURVE
ELEV	ELEVATION	P O S	POINT on SPIRAL
ELONG	ELONGATED	P D S T	POINT on SEMI-TANGENT
EMB	EMBANKMENT	P D T	POINT on TANGENT
EMUL	EMULSIFIED	P P	POWER POLE
E O	EDGE of DIL	PREST	PRESTRESSED
ED	EQUATION	PROC	PROCESSING
ESMT	EASEMENT	PROJ	PROJECT or PROJECTED
EX	EXISTING	PROT	PROTECT, PROTECTOR or PROTECTION
EXC	EXCAVATION	PT	POINT
EXT	EXTENSION or EXTERNAL	P T	POINT of TANGENT (End of Curve)
F	FILL	P T W	PRESENT TRAVELED WAY
F A	FEDERAL AID	PWR	POWER (Lines)
FE	FENCE	D	PEAK DISCHARGE (Water)
FERT	FERTILIZER	R	RANGE, CURVE RADIUS, RISE
F E T S	FLARED END TERMINAL SECTION	R C	RAPID CURING
FIN	FINISH	R C P	REINFORCED CONCRETE PIPE
F L	FLOW LINE	R C P A	REINFORCED CONCRETE PIPE ARCH
FR	FRONTAGE	RD	ROAD
FT	FOOT	RDWY	ROADWAY
FUT	FUTURE	REINF	REINFORCEMENT
G	GRADING	R R	RAILROAD
GA	GAGE	RT	RIGHT
GAL	GALLON	R/W	RIGHT OF WAY
GALV	GALVANIZED	RTE	ROUTE
GAR	GARAGE	RY	RAILWAY
G R	GUARD RAIL	S	RATE of FULL SUPERELEVATION, SLOPE in FT. per FT., SPAN or SOUTH
GR	GRADE	S B	SOUTHBOUND
G S	GRAVEL SURFACING	S C	SLOW CURING
GTR	GUTTER	S C	SPIRAL to CURVE
H B T	HUBB TACK	SDWK	SIDEWALK
HOWL	HEADWALL	S E	SOUTHEAST
HG	HEADGATE	SEC	SECTION or SECOND
HO	HOUSE	SH	SHOULDER
HOR	HORIZONTAL	SHT	SHEET
HT	HEIGHT	SPEC. PROV	SPECIAL PROVISION
HWY	HIGHWAY	SAN SEW	SANITARY SEWER
H W	HIGH WATER	S S P A C	STRUCTURAL STEEL PLATE PIPE ARCH CULVERT
I	INTERSTATE	S S	EMULSIFIED ASPHALT
I C	INCIDENTAL CONSTRUCTION	S T	SPIRAL to TANGENT
INC	INCORPORATED	ST	STREET
INCL	INCLUDE	STA	STATION
INT	INTERCHANGE	STL	STEEL
I P	IRON PIN		
IRR	IRRIGATION		
L	LENGTH of CURVE	STD	STANDARD
LBS	POUNDS	STD SPEC	STANDARD SPECIFICATIONS
L C	LENGTH of CIRCULAR CURVE	STK	STAKED or STAKE
LENG	LENGTH-LENGTH	STM SEW	STORM SEWER
L F	LINEAR FEET	STR	STRUCTURE
L S	LENGTH of SPIRAL	SUBGR	SUBGRADE
LT	LEFT	SURF	SURFACE
MATL	MATERIAL	S W	SOUTHWEST
MAX	MAXIMUM	SYP	SYPHON
M C	MEDIUM CURING	S Y	SQUARE YARD
MED	MEDIAN	T	TOWNSHIP, TANGENT LENGTH or PERCENT TRUCKS
MH	MANHOLE	TBR	TIMBER
MIN	MINIMUM, MINERAL or MINUTE	TEL	TELEPHONE
MISC	MISCELLANEOUS	TELG	TELEGRAPH
M L	MAINLINE	TRANS	TRANSMISSION LINE or TRANSITION
MNCPL	MUNICIPAL	T S	LENGTH of TANGENT (Curve with Spirals)
MDN	MONUMENT	T S	TANGENT to SPIRAL
M Y	MILE YARD	TYP	TYPICAL
N	NORTH	U	UNIT
N B	NORTHBOUND		
N C	NORMAL CROWN	UNC	UNCLASSIFIED
N E	NORTHEAST	U'PASS	UNDERPASS
N G	NATURAL GAS	V	DESIGN SPEED or VELOCITY
N W	NORTHWEST	V C	VERTICAL CURVE
O'PASS	OVERPASS	VEH	VEHICULAR
P	POWER CABLE	VERT	VERTICAL
P C	POINT of CURVE (Beginning)	VIT	VITRIFIED
P C C	POINT of COMPOUND CURVE or PORTLAND CEMENT CONCRETE	W	WEST
P E	PRELIMINARY ENGINEERING	W B	WESTBOUND
PAVT	PAVEMENT	W T	WATER TABLE
PEN	PENETRATION	WT	WEIGHT
		X-ING	CROSSING
		X-SECT	CROSS SECTION

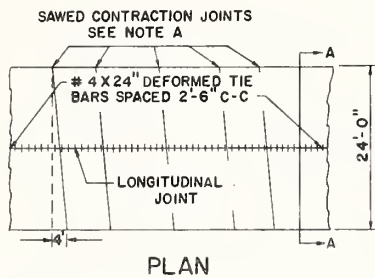
PROFILE

	CULVERT
	IRRIGATION SYPHON
	CONCRETE BOX CULVERT

CROSS SECTIONS

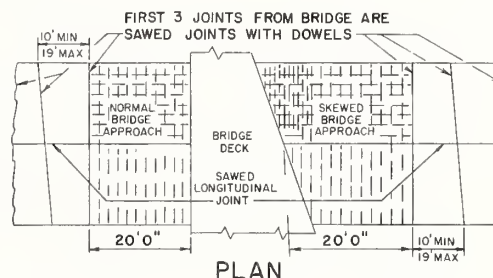
	POWER POLE (No of Wires & Voltage)
	TELEPHONE POLE (No of Wires)
	TELEGRAPH POLE (No of Wires)
	GUY POLE
	GUY AND ANCHOR

8" X 24' PLAIN P.C. CONCRETE PAVEMENT



PLAN

NOTE C:
CONTRACTION JOINTS SHALL
BE CONSTRUCTED AT LEAST
5' FROM ANY CONSTRUCTION
JOINT (STD. DWG.)



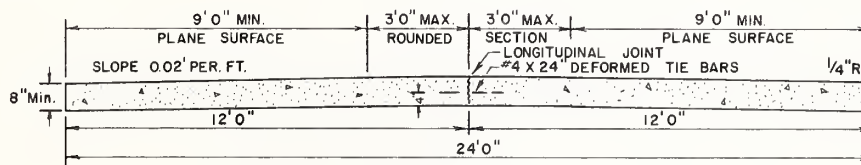
PLAN

SAWED JOINT DETAIL FOR BRIDGE APPROACH PANELS

NOTE A: CONTRACTION JOINTS SHALL BE SAWED DIAGONALLY AS SHOWN
ABOVE UNLESS SHOWN OTHERWISE ON THE PLANS.
OFFSET = 4' IN 24' AND SKEWED COUNTERCLOCKWISE TO THE DIRECTION
OF TRAFFIC MOVEMENT.

NOTE B: THE 10' MIN AND 19' MAX. DIMENSIONS SHOWN ABOVE ARE ALSO
APPLICABLE FOR THE FIRST CONTRACTION JOINT ON EITHER SIDE
OF AND EXPANSION JOINT LAYOUT.

SPACING OF THE JOINTS SHALL BE 13', 19', 18', 12' AND REPEAT EXCEPT
FOR THE FIRST JOINT AT BRIDGE APPROACH PANELS OR EXPANSION
JOINT LAYOUT.



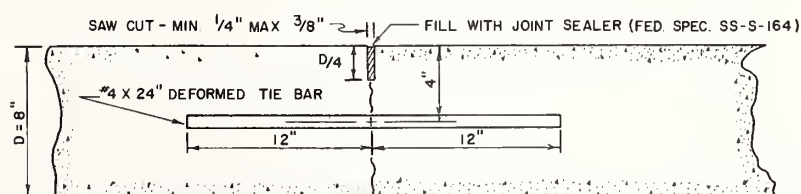
SECTION A-A

FOR CONTRACTION JOINT DETAIL

FOR LOCATION AND DETAILS OF DOWELED CONTRACTION JOINTS

DEFORMED TIE BARS TO BE INCLUDED IN UNIT PRICE BID FOR P.C. CONCRETE PAVEMENT.

SAWED LONGITUDINAL JOINT WITH DEFORMED TIE BARS



MAXIMUM SPACING OF TIE BARS 2' 6" C-C.

TIE BARS MAY BE INSTALLED AFTER THE CONCRETE HAS BEEN STRUCK OFF AND PRIOR TO FINAL
FINISHING, BY AN INSTALLING DEVICE, PREVIOUSLY APPROVED BY THE ENGINEER, WHICH WILL PLACE THE
TIE BARS IN THE REQUIRED POSITIONS AND LOCATION.

TIE BARS PLACED IN ADVANCE OF CONCRETE PLACING OPERATIONS SHALL BE RIGIDLY AND SECURELY
SUPPORTED IN THE REQUIRED POSITION AT THE JOINT BY CHAIRS, STAKES AND OR SUPPORTING DEVICES.
THE SUPPORTING DEVICES MAY BE FACTORY ASSEMBLED. THE CONTRACTOR SHALL FURNISH THE ENGINEER
WITH DETAIL DRAWING OF THESE DEVICES, A SUFFICIENT TIME IN ADVANCE OF CONSTRUCTION, FOR HIS
APPROVAL. ANY APPROVAL OF DRAWINGS OF THESE DEVICES SHALL BE CONSIDERED TENTATIVE AND FINAL
APPROVAL SHALL BE CONTINGENT UPON THEIR SATISFACTORY PERFORMANCE.

SEE STANDARD SPECIFICATIONS ARTICLE 39.04 (K) (4) FOR SAWED JOINT.

THE COST OF THE TIE BARS, JOINT SEALER, AND SUPPORTING DEVICES SHALL BE INCLUDED IN THE
UNIT PRICE BID PER SQUARE YARD OF P.C. CONCRETE PAVEMENT.

NOTE: THIS JOINT MAY BE USED AT OTHER LOCATIONS IF CALLED FOR ON THE PLANS.

STANDARD DRAWING

REFERENCE DWG. NO.
STANDARD SPEC. 15
SECTION 39

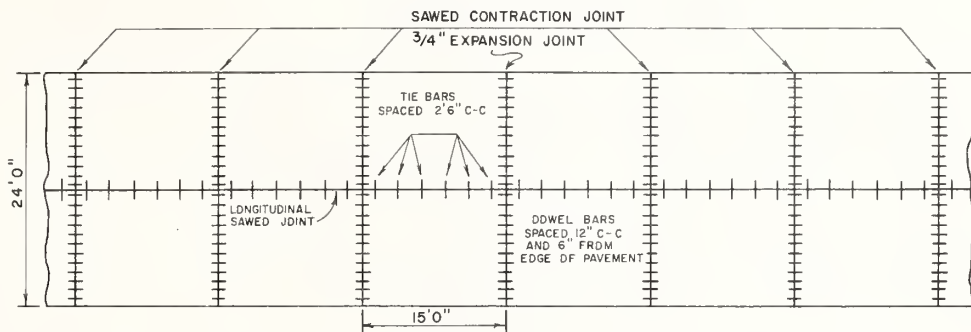
**8" P.C. CONCRETE PAVEMENT
SAWED JOINTS WITH TIE BARS**

APPROVED: H. J. ANDERSON, DIRECTOR OF HIGHWAYS
BY: *Jack R. [Signature]*
ADMINISTRATOR-ENGINEERING DIVISION

REVISED
EFFECTIVE

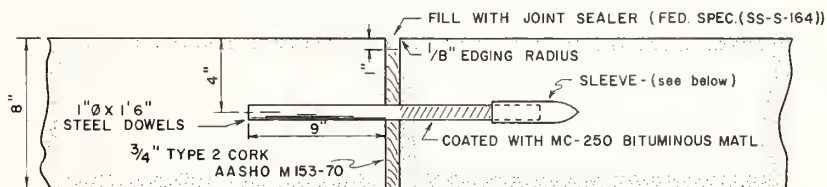
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EXPANSION JOINT LAYOUT



3/4" EXPANSION JOINT TO BE FILLED WITH TYPE 2 CORK AND JOINT SEALER. SMOOTH STEEL DOWELS WITH SLEEVES AT EXPANSION JOINT SMOOTH STEEL DOWEL WITHOUT SLEEVES STD DWG NO. 17 COATED WITH MC-250 BITUMINOUS MATERIAL FOR ONE-HALF THE LENGTH OF THE DOWEL, INSTALLED IN SAWED CONTRACTION JOINT, THE FIRST THREE CONTRACTION JOINTS EACH SIDE OF EXPANSION JOINT.

EXPANSION JOINT



DOWELS SPACED 12" C-C BEGINNING 6" FROM OUTER EDGES OF PAVEMENT.

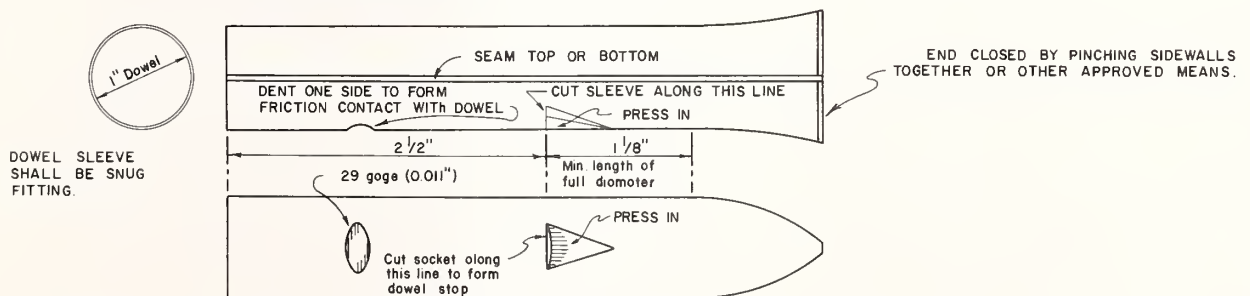
DOWELS TO BE PROVIDED WITH DOWEL SLEEVES

ONE-HALF THE LENGTH OF THE DOWEL ON WHICH THE SLEEVE IS PLACED SHALL BE THOROUGHLY COATED WITH MC-250 BITUMINOUS MATERIAL OR HEAVY GREASE. SLEEVES TO BE PLACED ON ALTERNATE ENDS OF DOWEL BARS.

THE TYPE 2 CORK EXPANSION JOINT FILLER, AASHO M 153-70 SHALL CONFORM TO THE DIMENSIONS SHOWN AND CUT TO FIT THE CROWN AND SUBGRADE.

THE CONTRACTOR SHALL FURNISH CHAIRS, STAKES, AND/OR SUPPORTING DEVICES CAPABLE OF HOLDING THE DOWELS AND JOINT FILLER, SECURELY AND RIGIDLY, IN THEIR REQUIRED POSITIONS. THE DOWEL AND JOINT FILLER SUPPORTING DEVICES MAY BE FACTORY ASSEMBLED. THE CONTRACTOR SHALL FURNISH THE ENGINEER WITH DETAIL DRAWINGS OF THESE DEVICES, A SUFFICIENT TIME IN ADVANCE OF CONSTRUCTION, FOR HIS APPROVAL. ANY APPROVAL OF DRAWINGS OF THESE DEVICES SHALL BE CONSIDERED TENTATIVE AND FINAL APPROVAL SHALL BE CONTINGENT UPON THEIR SATISFACTORY PERFORMANCE.

DOWEL SLEEVE FOR 1" DOWEL BARS



SLEEVES TO BE PLACED ON ALTERNATE OPPOSITE ENDS OF DOWELS. HALF THE LENGTH OF THE DOWEL, ON THE END ON WHICH THE SLEEVE IS PLACED, SHALL BE THOROUGHLY COATED WITH MC-250 BITUMINOUS MATERIAL OR HEAVY GREASE TO BREAK THE BOND.

DOWELS, DOWEL SLEEVES, JOINT FILLER MC-250 AND SEALER, TOGETHER WITH THE SUPPORTING DEVICES NECESSARY FOR THE PROPER INSTALLATION OF THE JOINT, SHALL BE INCLUDED IN THE UNIT PRICE BID PER SQUARE YARD FOR P.C. CONCRETE PAVEMENT.

STANDARD DRAWING

REFERENCE: DWG. NO.
STANDARD SPEC. 16
SECTION 39

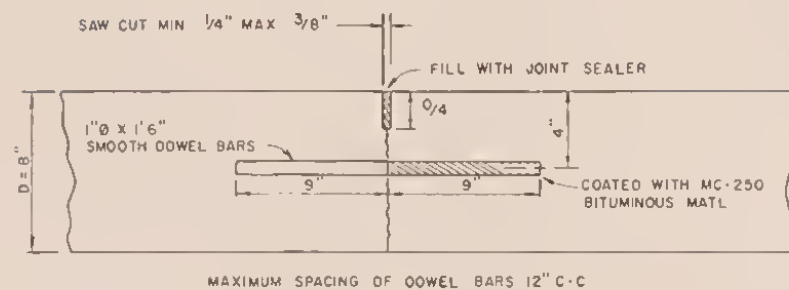
8" P.C. CONCRETE PAVEMENT
EXPANSION JOINTS & DOWEL SLEEVES

APPROVED: H. J. ANDERSON - DIRECTOR OF HIGHWAYS
BY: *[Signature]*
ADMINISTRATOR - ENGINEERING DIVISION

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SAWED JOINT WITH DOWEL BARS

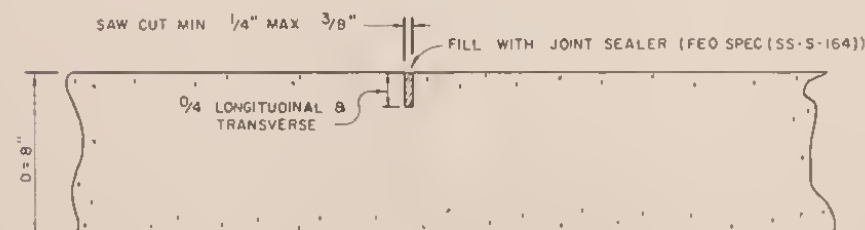


ONE-HALF LENGTH OF THE DOWEL BARS ON ALTERNATE ENDS SHALL BE THOROUGHLY COATED WITH MC-250 BITUMINOUS MATERIAL OR HEAVY GREASE

THE CONTRACTOR SHALL FURNISH CHAIRS, STAKES AND/OR SUPPORTING DEVICES CAPABLE OF HOLDING THE DOWELS SECURELY AND RIGIDLY, IN THEIR REQUIRED POSITIONS. THE DOWEL SUPPORTING DEVICES MAY BE FACTORY ASSEMBLED. THE CONTRACTOR SHALL FURNISH THE ENGINEER WITH DETAIL DRAWINGS OF THESE DEVICES, A SUFFICIENT TIME IN ADVANCE OF CONSTRUCTION, FOR HIS APPROVAL. ANY APPROVAL OF DRAWINGS OF THESE DEVICES SHALL BE CONSIDERED TENTATIVE AND FINAL APPROVAL SHALL BE CONTINGENT UPON THEIR SATISFACTORY PERFORMANCE.

DOWEL BARS MAY BE PLACED BY MECHANICAL EQUIPMENT IF APPROVED BY THE ENGINEER.

SAWED CONTRACTION JOINT

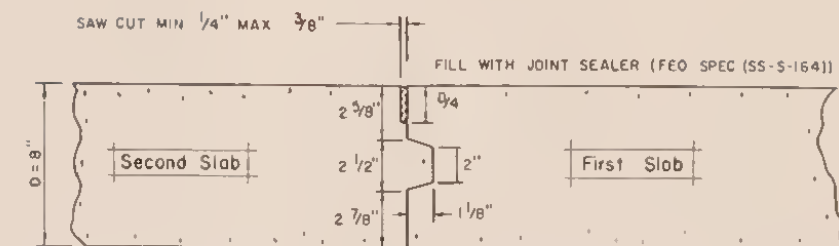


SEE STANDARD SPECIFICATION, ARTICLE 39.04(J)(4) FOR SAWED CONTRACTION JOINT DETAILS.

WHERE INTEGRAL CURB IS CALLED FOR, THE JOINT SHALL BE CONTINUED THROUGH THE INTEGRAL CURB.

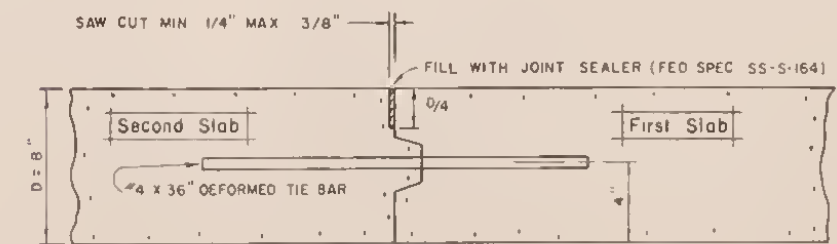
THE COST OF JOINT SEALER, DOWEL BARS, SUPPORTING DEVICES AND CONSTRUCTING THE SAWED JOINT SHALL BE INCLUDED IN THE UNIT PRICE BID PER SQUARE YARD OF P.C. CONCRETE PAVEMENT.

LONGITUDINAL KEYWAY JOINT



KEYWAY JOINT (1 1/8" X 2") MAY BE FORMED WITH WOOD STRIP OR APPROVED METAL FORM. KEYWAY FORMS SHALL BE CLEANED AND OILED EACH TIME THEY ARE USED.

LONGITUDINAL KEYWAY JOINT WITH TIE BARS



MAXIMUM SPACING OF TIE BARS 2'6" C-C

LONGITUDINAL KEYWAY JOINTS SHALL BE USED WHEN PAVEMENT IS CONSTRUCTED IN SINGLE ALTERNATE LANES AND WITH DEFORMED TIE BARS WHEN CALLED FOR ON THE PLANS.

DEFORMED TIE BARS SHALL BE RIGIDLY AND SECURELY SUPPORTED IN THE REQUIRED POSITION AT THE JOINT, BY CHAIRS, STAKES AND/OR SUPPORTING DEVICES. THE SUPPORTING DEVICES MAY BE FACTORY ASSEMBLED. THE CONTRACTOR SHALL FURNISH THE ENGINEER WITH DETAIL DRAWINGS OF THESE DEVICES, A SUFFICIENT TIME IN ADVANCE OF CONSTRUCTION, FOR HIS APPROVAL. ANY APPROVAL OF DRAWINGS OF THESE DEVICES SHALL BE CONSIDERED TENTATIVE AND FINAL APPROVAL SHALL BE CONTINGENT UPON THEIR SATISFACTORY PERFORMANCE. JOINT MAY BE USED AT OTHER LOCATIONS IF CALLED FOR ON THE PLANS.

DEFORMED TIE BARS, JOINT MATERIALS AND SUPPORTING DEVICES ARE TO BE INCLUDED IN THE UNIT PRICE BID PER SQUARE YARD FOR P.C. CONCRETE PAVEMENT.

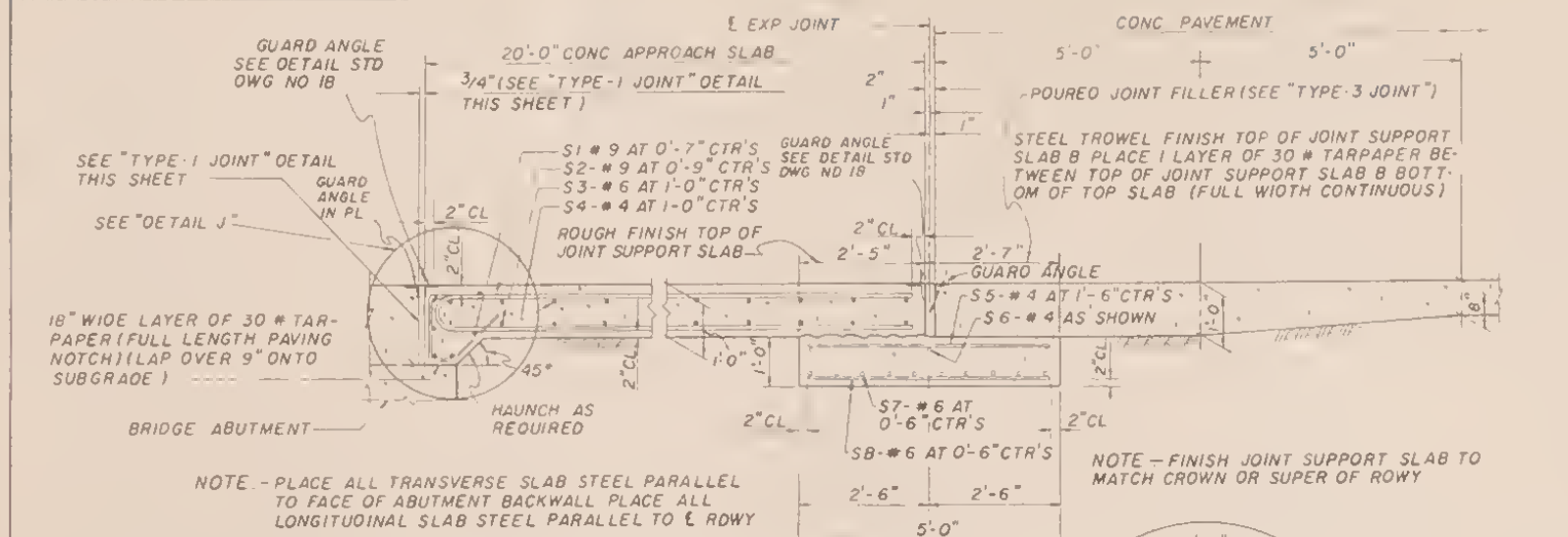
STANDARD DRAWING

REFERENCE: DWG. NO. 17
STANDARD SPEC. 17
SECTION 39

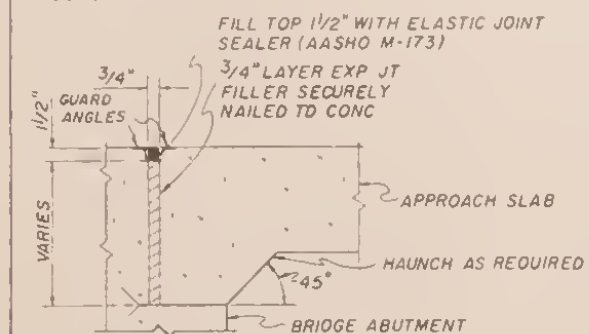
8" P.C. CONCRETE PAVEMENT
SAWED AND KEYWAY JOINTS

APPROVED: H.J. ANDERSON - DIRECTOR OF HIGHWAYS
BY: *Frank R. B...*
ADMINISTRATOR - ENGINEERING DIVISION

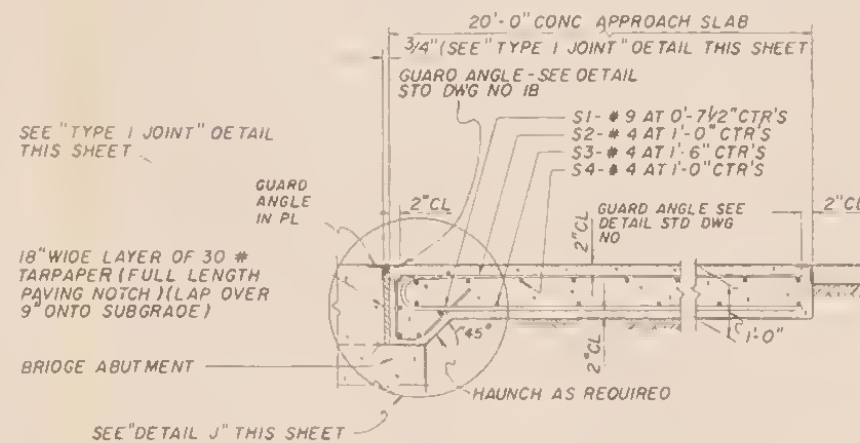
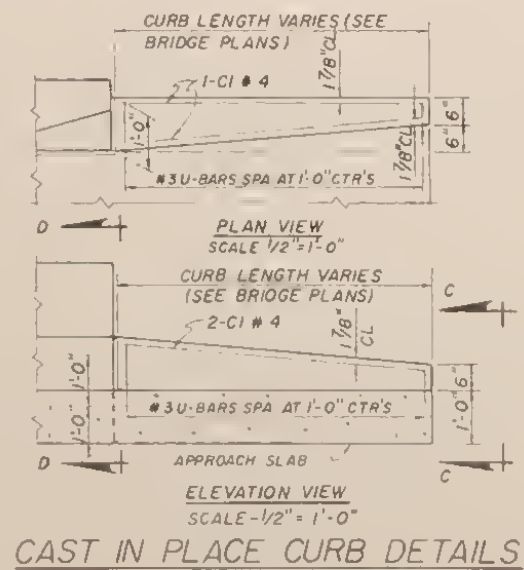
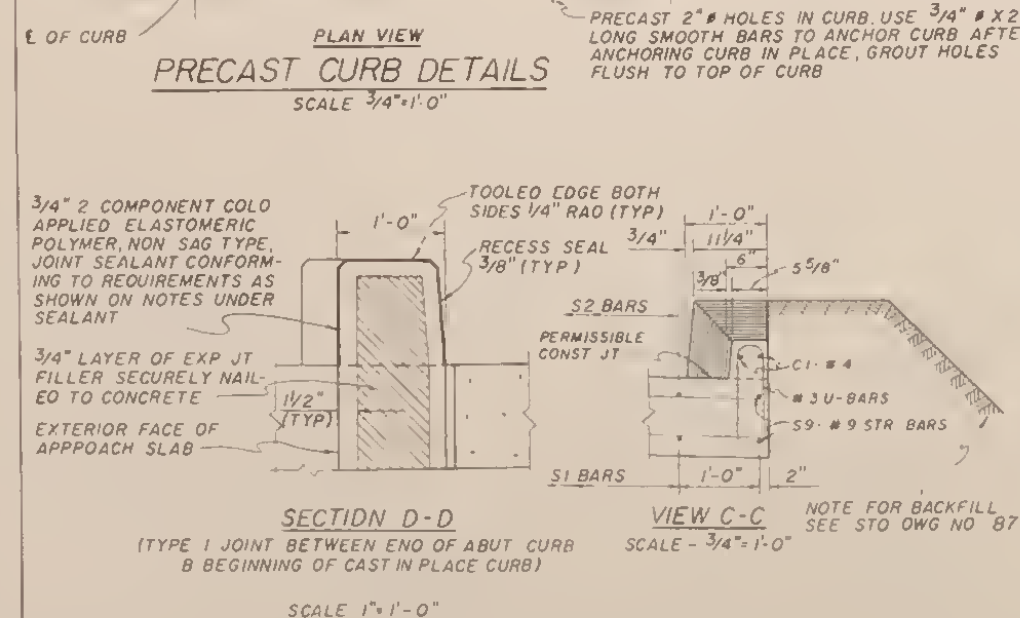
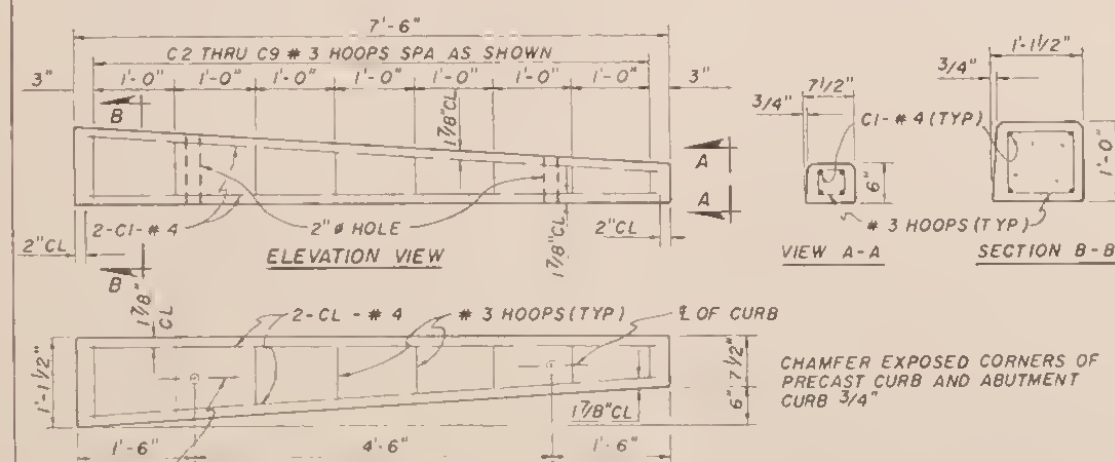
REVISED
EFFECTIVE 3/1/72



APPLICATION TEMPERATURE OF AASHTO M173-60 ELASTIC JOINT SEALER SHALL BE 250° PLUS OR MINUS 10° MAXIMUM

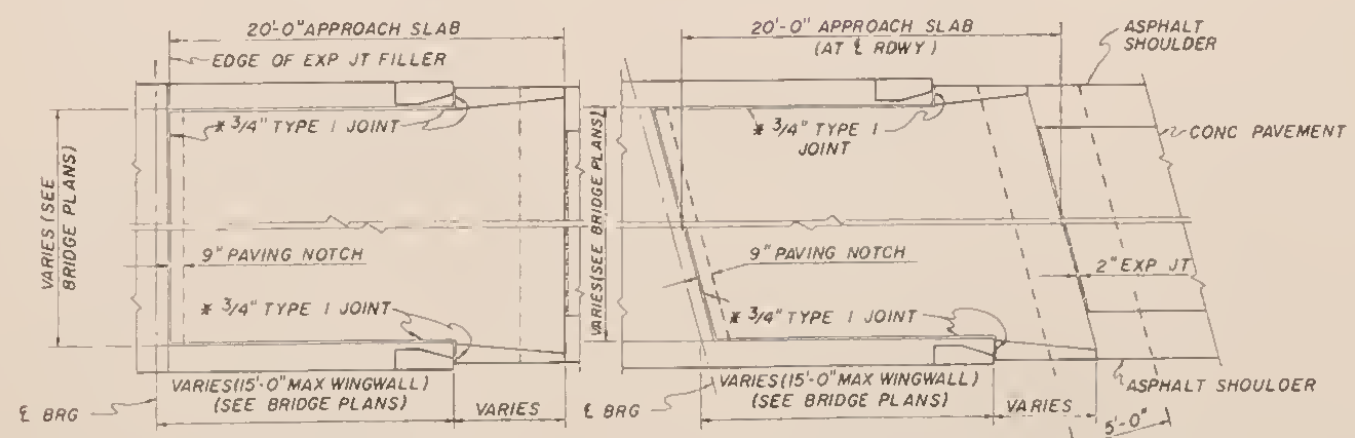


TYPE 3 JOINT
(FOR USE OVER JOINT SUPPORT SLAB ONLY)
SCALE - 1" = 1'-0"

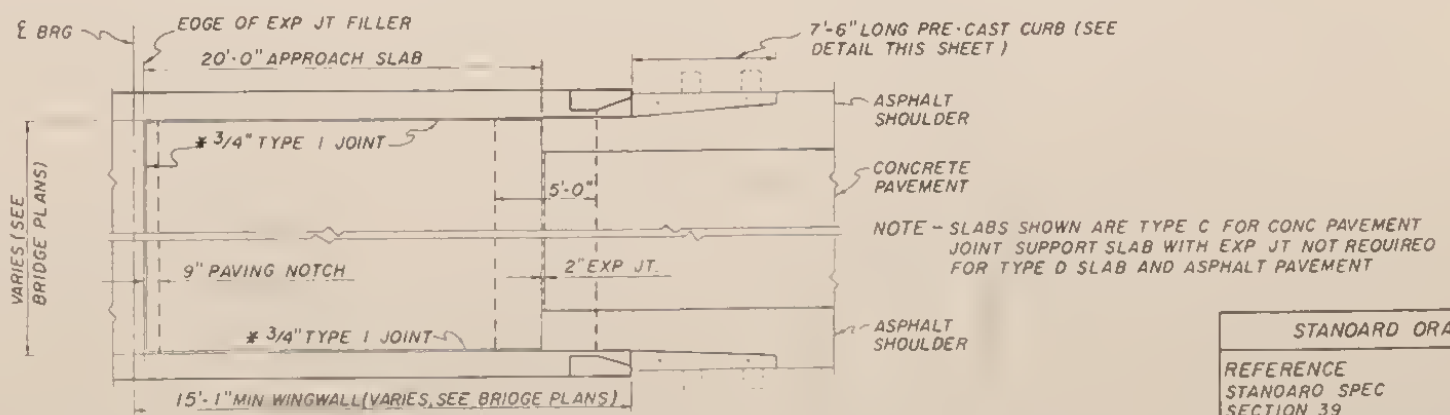


LONGITUDINAL CONSTRUCTION JOINT DETAIL
SCALE - 1 1/2" = 1'-0"

(USE ONLY WHEN SHOWN ON THE PLANS OR APPROVED BY THE ENGINEER)



APPROACH SLAB WITH PRECAST CURBS (15'-1" MINIMUM WINGWALLS)
SCALE 3/16" = 1'-0"



APPROACH SLAB: APPROACH SLAB SHALL BE CONSTRUCTED IN ACCORDANCE WITH SECTION 41 OF THE STANDARD SPECIFICATIONS THE SLAB SHALL BE FINISHED AS SPECIFIED FOR BRIDGE DECKS IN ARTICLE 41.04(K)2.B.3 OF THE STANDARD SPECIFICATIONS CONCRETE SHALL BE EITHER CLASS A0 OR CLASS A1 AT CONTRACTOR'S OPTION

REINFORCING STEEL: REINFORCING STEEL SHALL BE IN ACCORDANCE WITH SECTION 47 OF THE STANDARD SPECIFICATIONS EXCEPT METHOD OF MEASUREMENT AND PAYMENT SHALL BE AS SET FORTH BELOW

FOUNDATION: THE FOUNDATION FOR THE APPROACH SLAB AND JOINT SUPPORT SLAB SHALL CONSIST OF THE SUBGRADE AND BASE CONSTRUCTED AND COMPACTED IN ACCORDANCE WITH THE STANDARD SPECIFICATIONS EXCAVATION FOR JOINT SUPPORT SLAB SHALL BE HELD TO A MINIMUM AND ALL AREA EXCAVATED BUT NOT FILLED WITH CONCRETE SHALL BE BACKFILLED WITH THE SAME MATERIAL THAT WAS TAKEN FROM THE EXCAVATION ALL BACKFILL SHALL BE LAYER PLACED AND COMPACTED WITH MECHANICAL TAMPERS THE COST OF ALL EXCAVATION NECESSARY FOR THE PLACEMENT OF APPROACH SLAB AND JOINT SUPPORT SLAB SHALL BE INCLUDED IN THE UNIT PRICE BID FOR "CONCRETE APPROACH SLAB" AS SET FORTH BELOW

MEASUREMENT & PAYMENT: APPROACH SLABS SHALL BE MEASURED BY AREA IN SQUARE YARDS. THE WIDTH AND LENGTH FOR MEASUREMENT SHALL BE FROM OUT TO OUT OF COMPLETED SLAB NO ADDITIONAL AREA WILL BE ALLOWED FOR THE JOINT SUPPORT SLAB THE UNIT PRICE BID PER SQUARE YARD FOR "CONCRETE APPROACH SLAB" SHALL BE FULL COMPENSATION FOR FURNISHING ALL MATERIALS, EQUIPMENT, TOOLS AND LABOR NECESSARY TO COMPLETE THE WORK, INCLUDING THE JOINT SUPPORT SLAB AND LINSEED TREATMENT

PROTECTIVE COATING: APPROACH SLAB AND CURB SHALL BE GIVEN A PROTECTIVE COATING OF BOILED LINSEED OIL SEE STANDARD SPECIFICATIONS.

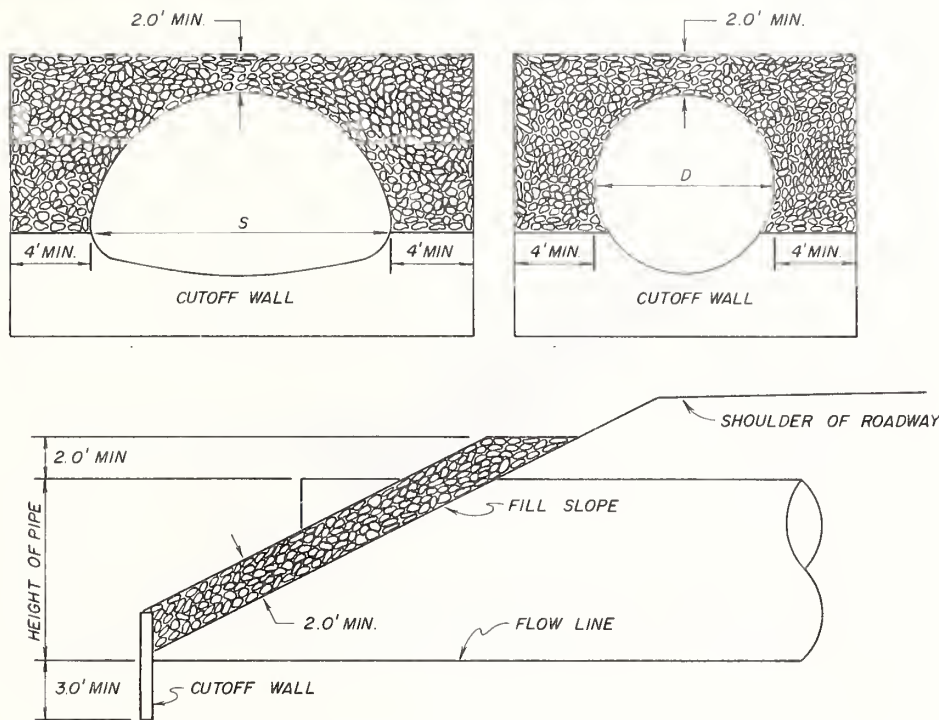
NOTE: TRAFFIC SHALL NOT BE PERMITTED ON NEW APPROACH SLAB FOR AT LEAST 14 DAYS AFTER CONCRETE HAS BEEN PLACED TRAFFIC SHALL NOT BE ALLOWED TO DRIVE WITHIN 5 FEET OF THE CONSTRUCTION JOINT AND SHALL BE RESTRICTED TO A SPEED OF NOT MORE THAN 5 M.P.H. FOR AT LEAST 48 HOURS AFTER THE CONCRETE IN ADJACENT SLAB HAS BEEN PLACED

* TYPE 2 JOINT MAY BE SUBSTITUTED AS SPECIFIED ON BRIDGE GENERAL LAYOUT FOR DETAIL OF TYPE 2 JOINT SEE STD DWG NO 18

STANDARD DRAWING	
REFERENCE	DWG NO.
STANDARD SPEC	19
SECTION 39	
STANDARD CONCRETE APPROACH SLABS TO STRUCTURES WITH U-TYPE ABUTMENTS	
APPROVED H. J. ANDERSON - DIRECTOR OF HIGHWAYS	
BY <i>[Signature]</i> ADMINISTRATOR - ENGINEERING DIVISION	

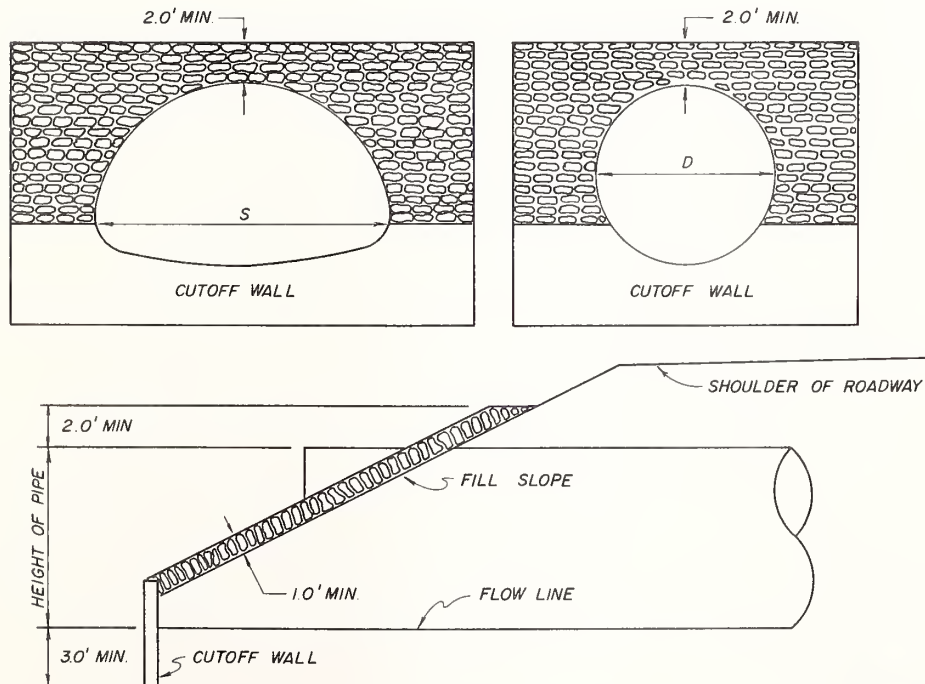
REVISED	
EFFECTIVE	3/1/72

RANDOM RIPRAP



SEE SPECIFICATIONS FOR GRADATION, TYPES AND CONSTRUCTION METHODS.

HAND LAID RIPRAP



ENDS OF RIPRAP WALLS SHALL BE KEYED INTO THE EMBANKMENT SLOPES A MINIMUM OF 2 FEET FROM OUTER FACE OF THE RIPRAP FOR THE FULL HEIGHT OF THE RIPRAP WALL.

SEE SPECIFICATION FOR GRADATION AND CONSTRUCTION METHOD

STANDARD DRAWING

REFERENCE
STANDARD SPEC.
SECTION 50

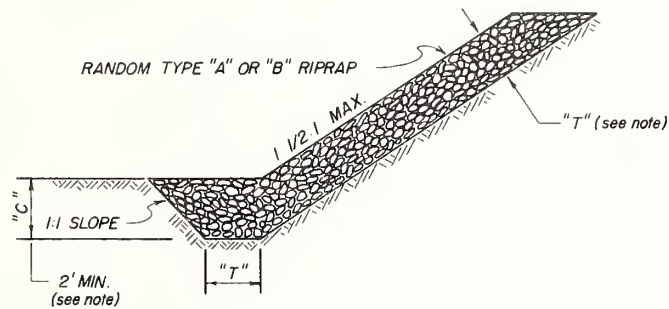
DWG. NO.
25

CULVERT RIPRAP

APPROVED: H. J. ANDERSON - DIRECTOR OF HIGHWAYS
BY: *Jack R. Beckert*
ADMINISTRATOR - ENGINEERING DIVISION

REVISED			
EFFECTIVE	3/1/72		

EMBANKMENT PROTECTION



"T" SHALL BE 1.5' MINIMUM UNLESS OTHERWISE SPECIFIED ON PLANS.

"C" SHALL BE 2.0' MINIMUM UNLESS OTHERWISE SPECIFIED FOR MORE PROTECTION DUE TO SCOUR.

STANDARD DRAWING

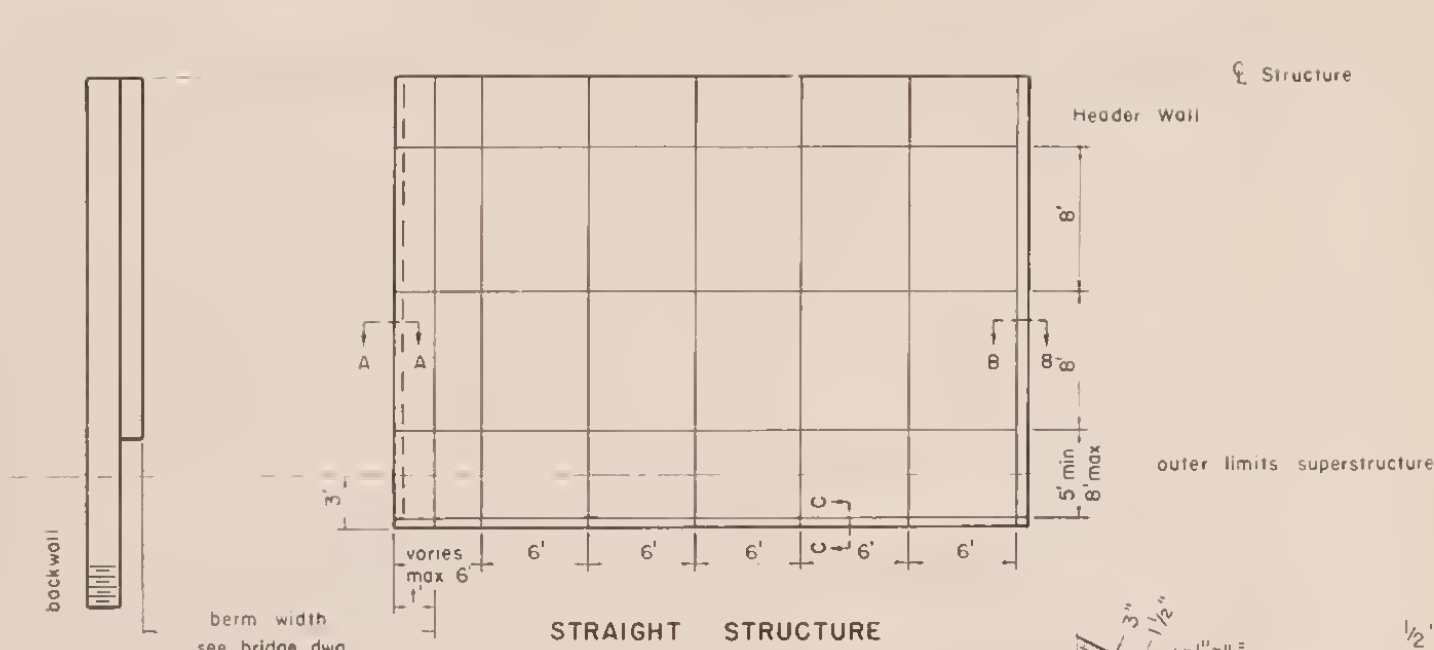
REFERENCE	DWG. NO.
STANDARD SPEC.	26
SECTION 50	

EMBANKMENT PROTECTION

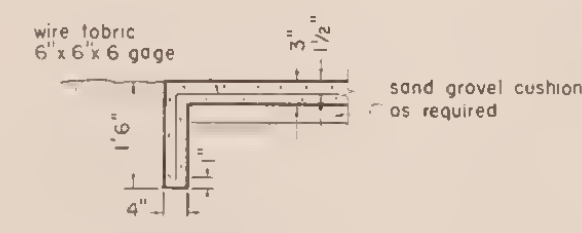
APPROVED: H. J. ANDERSON - DIRECTOR OF HIGHWAYS
BY: <i>Jack R. Belski</i>
ADMINISTRATOR - ENGINEERING DIVISION

REVISED			
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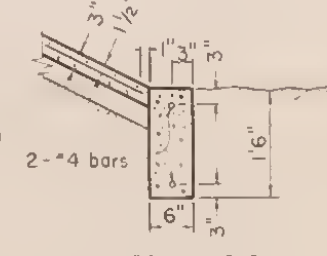
EFFECTIVE	3/1/72		
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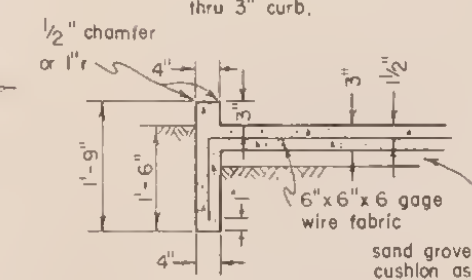
STRAIGHT STRUCTURE



SECTION A-A

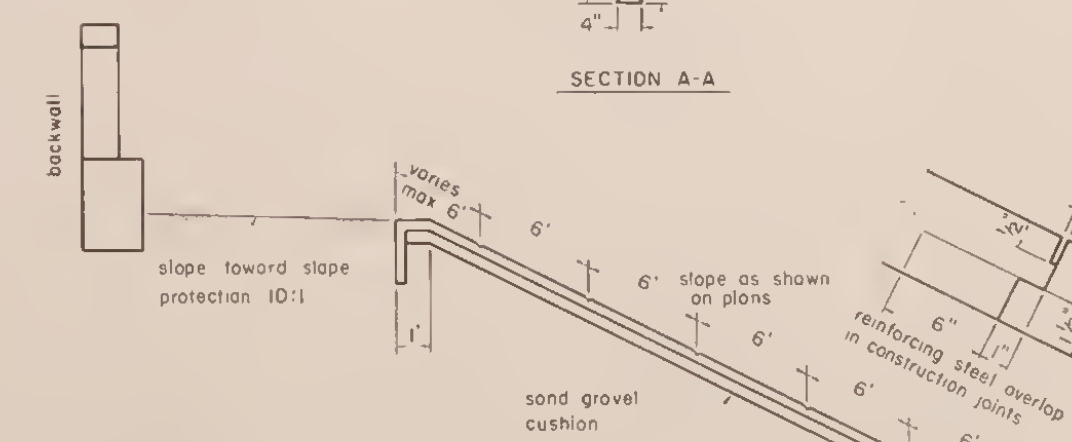


SECTION B-B
header wall



SECTION C-C

Joints may be sawed, made with the appropriate grooving tools, or removable inserts of an approved type.
If joints are sawed, sawing of joints shall be done just after concrete has set, but before uncontrolled cracking occurs.



VERTICAL & HORIZONTAL DIMENSION JOINT

To be placed at 6' vertical spacing or as noted
To be placed at 8' horizontal spacing or as noted
Joints may be sawed, made with grooving tools, or removable inserts of an approved type

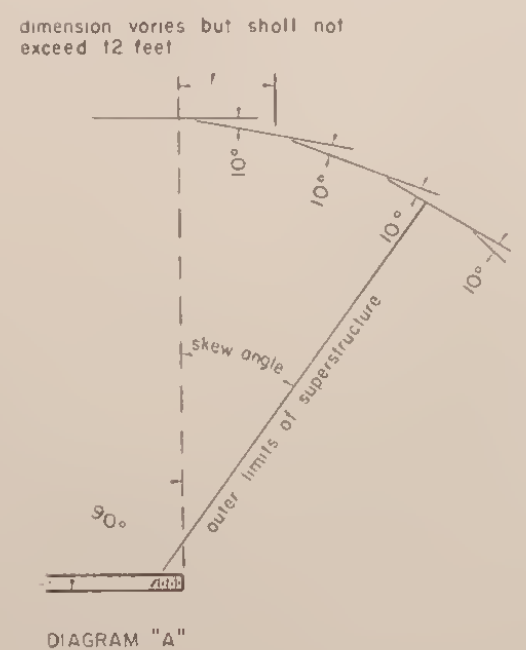
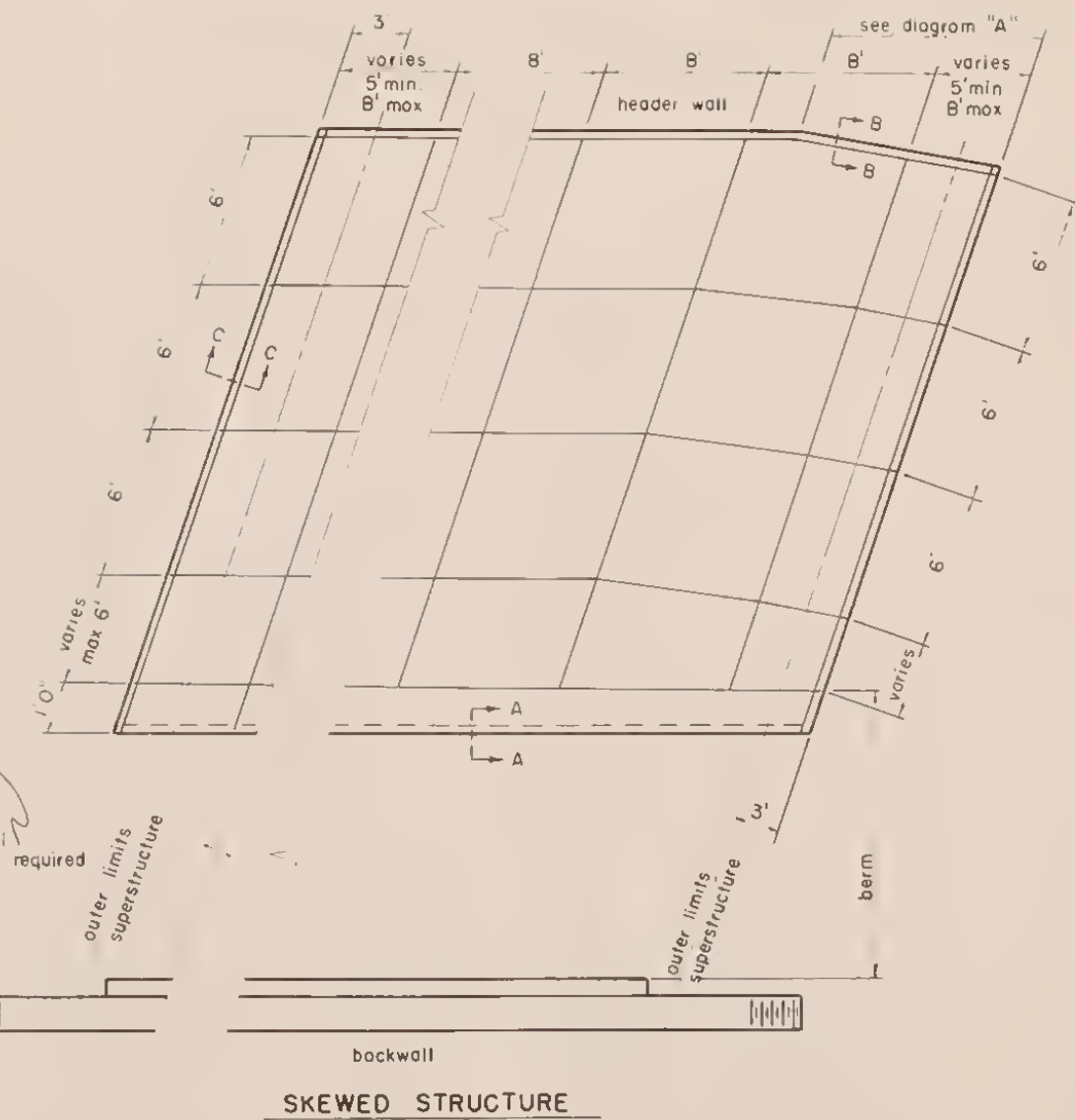


DIAGRAM "A"



SKewed STRUCTURE

CAST IN PLACE CONCRETE

Locate joints as indicated on the plans. If construction is stopped for over two hours a construction joint shall be made. Payment shall be the same as for concrete blocks. Class "DD" concrete shall be used for all cast-in-place concrete.

An approved one half inch expansion joint filler shall be used wherever the cast in place concrete abuts against any part of the bridge structure concrete - class "DD" or equal.

The embankment slope shall be cleared of all brush, debris and rubble. A cushion is required for dirt embankment slopes. A cushion is not required for gravelly embankment slopes. All slopes shall be finished to a reasonably uniform surface or to the slope indicated on the bridge plans. All loose material shall be compacted to the satisfaction of the engineer. Adjacent slope area shall be left in a smooth, uniform condition.

REINFORCING STEEL

(may use either alternate listed below)

- 1 3 bars at 0'10" centers (horiz & vert spacing)
min cover of 1 inch
- 2 Welded wire fabric 6"x6"x6 gage

Six inch lap required at construction joints for reinforcing steel

STANDARD DRAWING

REFERENCE STANDARD SPEC. SECTION 50
DWG. NO. 27

CONCRETE SLOPE PROTECTION

REVISED		8/10/72
EFFECTIVE	3/1/72	9/1/72

APPROVED: H. ANDERSON, DIRECTOR OF HIGHWAYS
BY: [Signature]
ADMINISTRATOR-ENGINEERING DIVISION

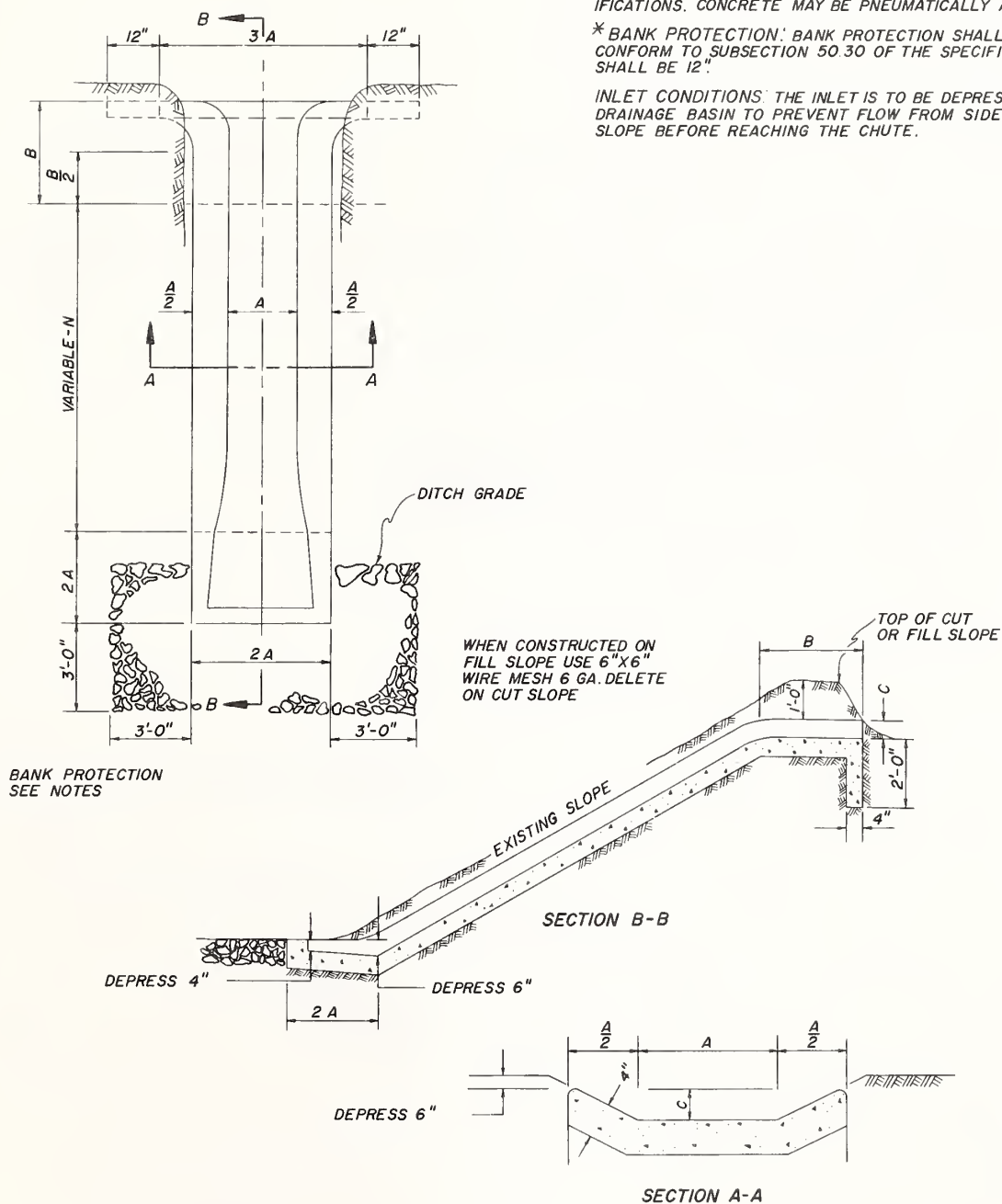
NOTES

SPECIFICATIONS: MONTANA DEPARTMENT OF HIGHWAYS STANDARD SPECIFICATIONS FOR ROAD AND BRIDGE CONSTRUCTION, ADOPTED OCTOBER 1, 1970 AND ANY AMENDMENTS THERETO, AND SPECIAL PROVISIONS SHALL GOVERN UNLESS OTHERWISE NOTED.

CONCRETE: ALL CONCRETE SHALL BE CLASS AC-DC UNLESS OTHERWISE NOTED. CONCRETE SHALL CONFORM TO SECTION 40 OF THE SPECIFICATIONS. CONCRETE MAY BE PNEUMATICALLY APPLIED.

*BANK PROTECTION: BANK PROTECTION SHALL BE TYPE 4 AND SHALL CONFORM TO SUBSECTION 50.30 OF THE SPECIFICATIONS. THICKNESS SHALL BE 12"

INLET CONDITIONS: THE INLET IS TO BE DEPRESSED BELOW THE NATURAL DRAINAGE BASIN TO PREVENT FLOW FROM SIDE CHANNELING OVER THE SLOPE BEFORE REACHING THE CHUTE.



DIMENSIONS			QUANTITIES
A	B	C	CONCRETE CU. YD.
2-0	4-0	0-4	0.7 CU. YD. + NX.051 CU. YD. /LIN. FT.
2-0	4-0	1-0	0.9 CU. YD. + NX.056 CU. YD. /LIN. FT.
4-0	8-0	1-0	2.2 CU. YD. + NX.105 CU. YD. /LIN. FT.
4-0	8-0	1-6	2.3 CU. YD. + NX.111 CU. YD. /LIN. FT.

*EXCAVATION AND BANK PROTECTION TO BE INCLUDED IN THE UNIT PRICE BID FOR CONCRETE.

STANDARD DRAWING

REFERENCE:	DWG. NO.
STANDARD SPEC.	28
SECTION 50	

CONCRETE DRAINAGE CHUTE

APPROVED: H. J. ANDERSON - DIRECTOR OF HIGHWAYS
BY Jack R. Baker
ADMINISTRATOR - ENGINEERING DIVISION

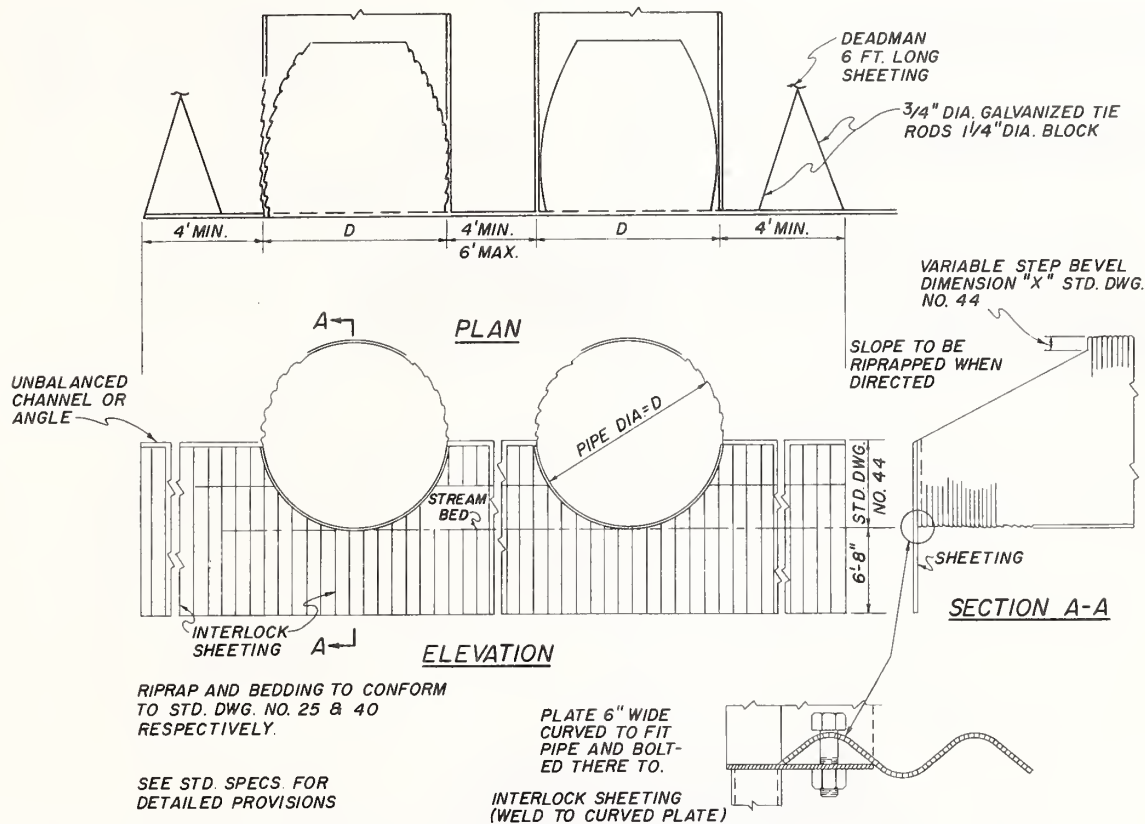
REVISÉ

EFFECTIVE	3/1/72
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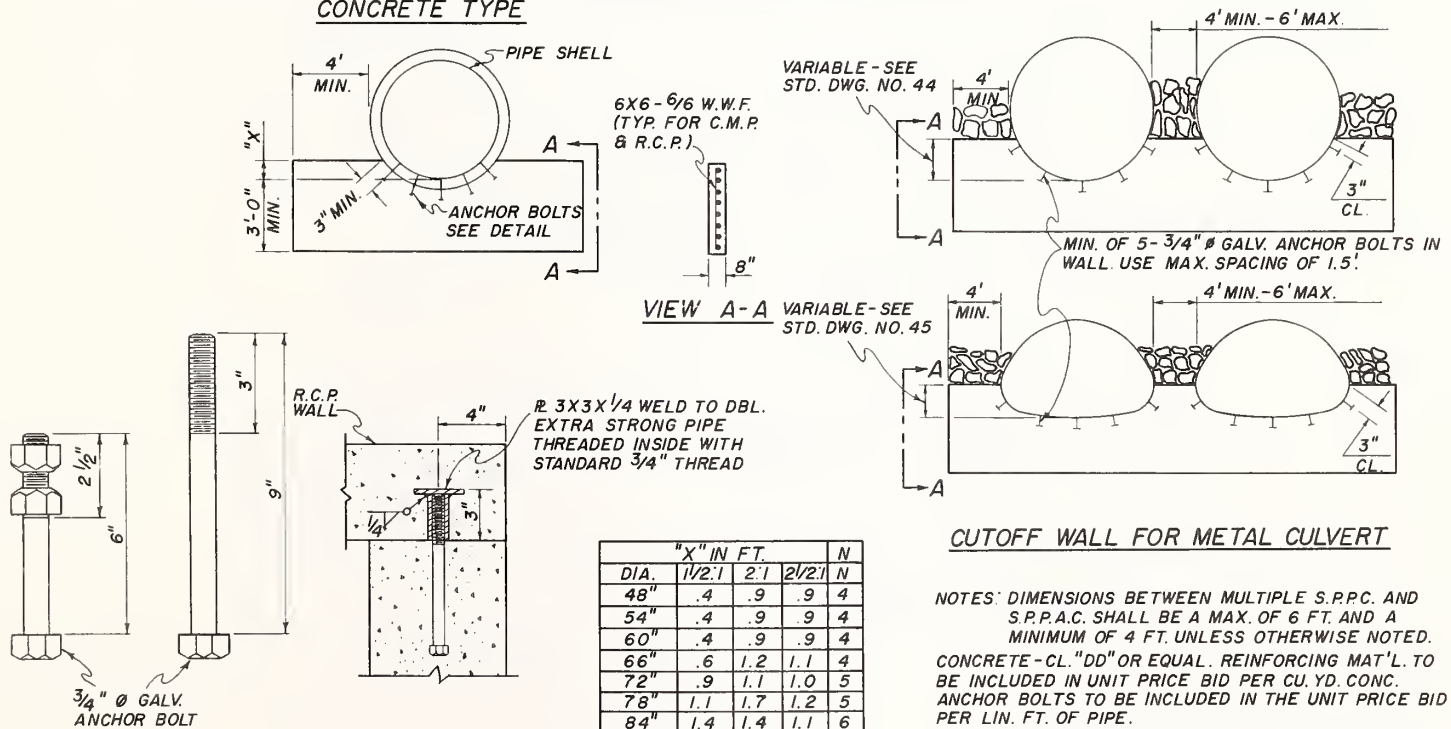


STANDARD DRAWING	
REFERENCE: STANDARD SPEC. SECTION 56	DWG. NO. 29
EMBANKMENT PROTECTOR	
APPROVED: H. J. ANDERSON, DIRECTOR OF HIGHWAYS By <i>Jack R. Beckert</i> ADMINISTRATOR - ENGINEERING DIVISION	

METAL TYPE



CONCRETE TYPE



ANCHOR BOLT DETAILS

6" LONG FOR METAL PIPE
9" LONG FOR CONCRETE PIPE

NOTES: DIMENSIONS BETWEEN MULTIPLE S.P.P.C. AND
S.P.P.A.C. SHALL BE A MAX. OF 6 FT. AND A
MINIMUM OF 4 FT. UNLESS OTHERWISE NOTED.
CONCRETE-CL. "DD" OR EQUAL. REINFORCING MAT'L. TO
BE INCLUDED IN UNIT PRICE BID PER CU. YD. CONC.
ANCHOR BOLTS TO BE INCLUDED IN THE UNIT PRICE BID
PER LIN. FT. OF PIPE.
SEE STD. DWG. NO. 40 & 41 FOR BACKFILL UNDER CULVERTS.
SEE STD. DWG. NO. 25 FOR RIPRAP.

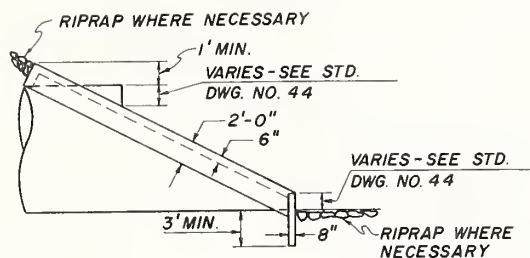
STANDARD DRAWING

REFERENCE: DWG. NO.
STANDARD SPEC. 30
SECTION 73

CUTOFF WALLS FOR CULVERTS

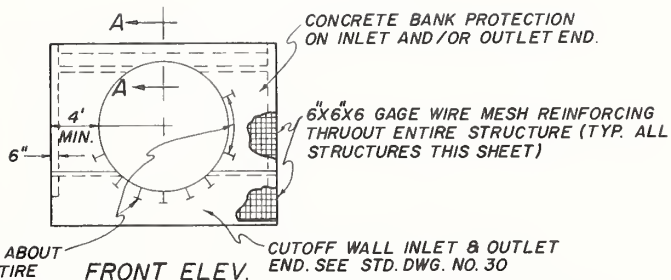
APPROVED: H. J. ANDERSON, DIRECTOR OF HIGHWAYS
BY: *Jack R. Keiser*
ADMINISTRATOR-ENGINEERING DIVISION

REVISED
EFFECTIVE 3/1/72



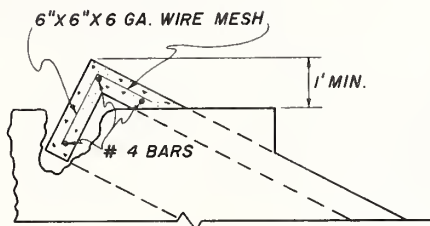
SIDE ELEV.

3/4" Ø ANCHOR BOLTS AT ABOUT 18" CENTERS AROUND ENTIRE PERIPHERY OF PIPE EMBEDDED IN CONCRETE. (TYP. ALL STRUCTURES THIS SHEET.) SEE DETAIL STD. DWG. NO. 30

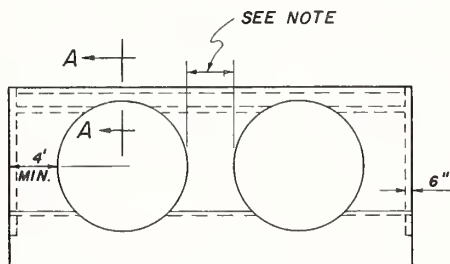


FRONT ELEV.

NOTE: DIMENSIONS BETWEEN MULTIPLE PIPES SHALL BE A MAX. OF 6' & A MIN. OF 4' UNLESS OTHERWISE NOTED.

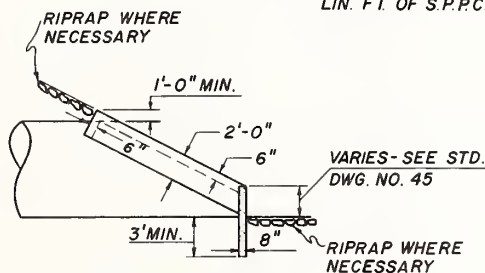


SECTION A-A

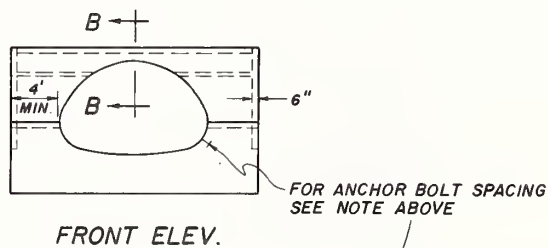


FRONT ELEVATION MULTIPLE PIPES

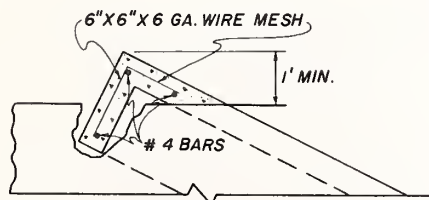
CL. "DD" CONCRETE OR EQUAL, REINFORCING MAT'L. TO BE INCLUDED IN THE UNIT PRICE BID PER CU. YDS. OF CONCRETE. ANCHOR BOLTS TO BE INCLUDED IN THE UNIT PRICE BID PER LIN. FT. OF S.P.P.C. OR S.P.A.C.



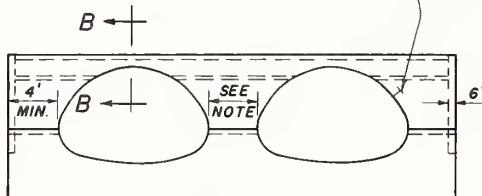
SIDE ELEV.




FRONT ELEV.



SECTION B-B

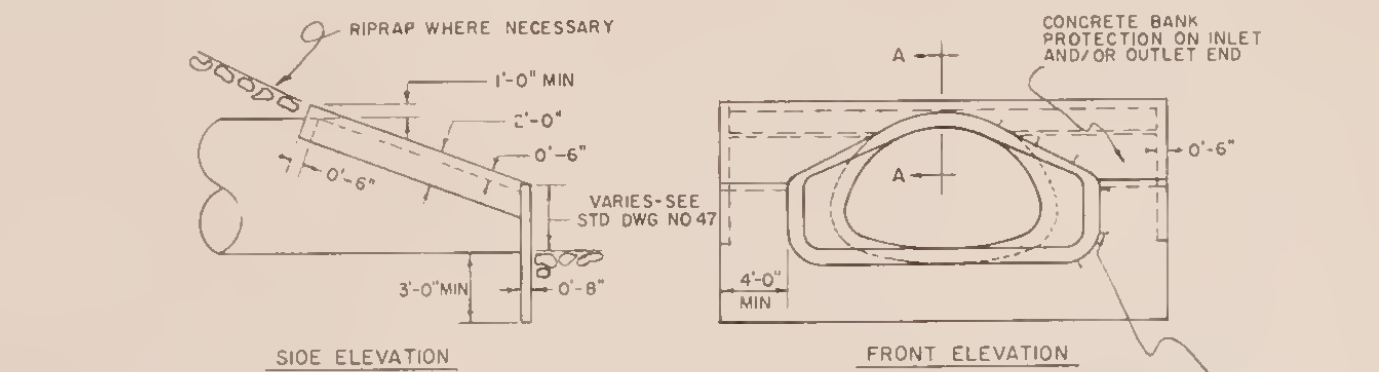


FRONT ELEVATION MULTIPLE PIPES

STANDARD DRAWING	
REFERENCE:	DWG. NO.
STANDARD SPEC.	31
SECTION 73	
CONCRETE EDGE PROTECTION FOR STRUCTURAL PLATE PIPE CULVERT & FOR STRUCTURAL PLATE PIPE ARCH CULVERT	
APPROVED: H. J. ANDERSON - DIRECTOR OF HIGHWAYS	
BY:	
ADMINISTRATOR - ENGINEERING DIVISION	

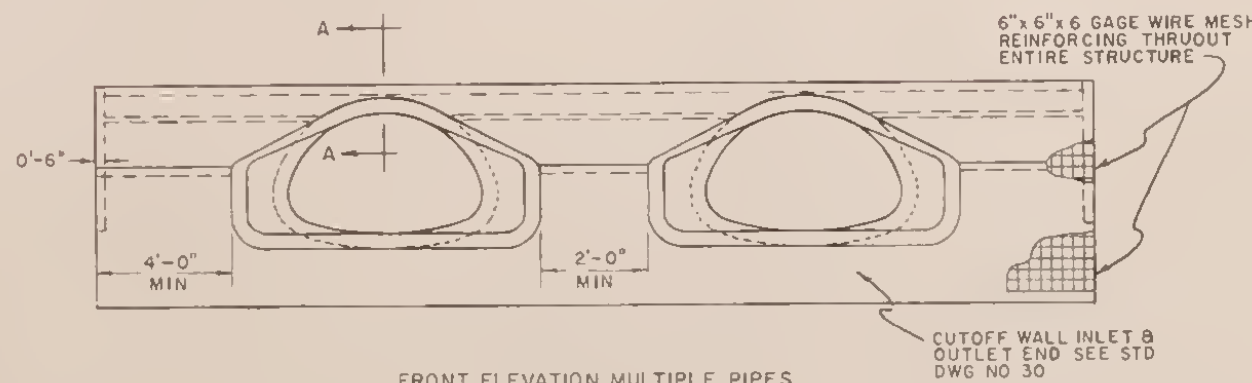
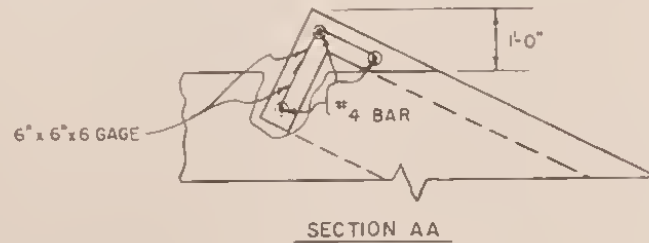
REVISED			
EFFECTIVE	3/1/72		

ARCH CULVERT



CLASS "DD" CONCRETE OR EQUAL, REINFORCED MAT'L TO BE INCLUDED IN THE UNIT PRICE BID PER CU. YDS. OF CONCRETE. ANCHOR BOLTS TO BE INCLUDED IN THE UNIT PRICE BID PER LIN. FT. OF ARCH CULVERT.

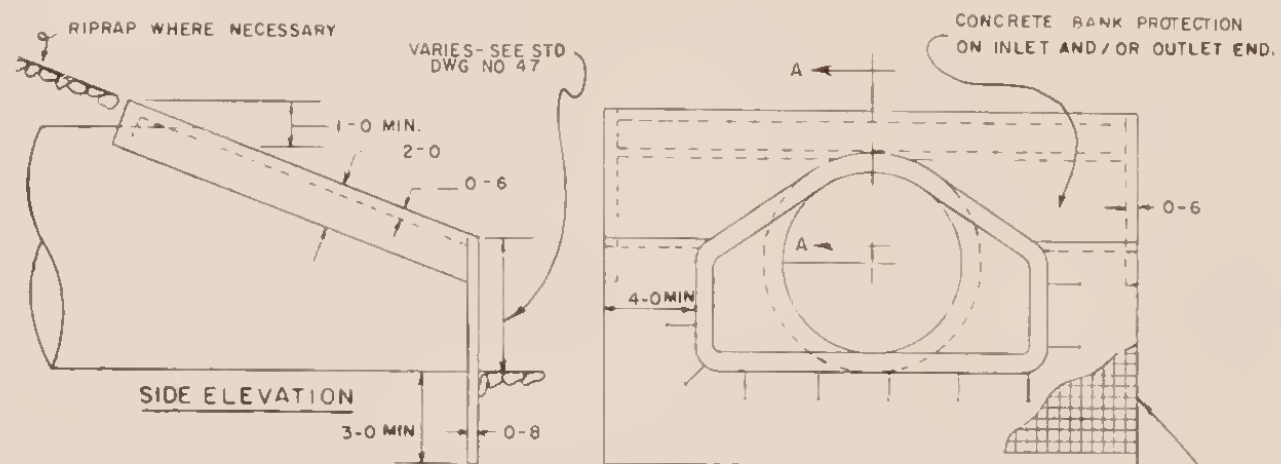
3/4" Ø ANCHOR BOLTS @ ABOUT 18" CENTERS AROUND ENTIRE PERIPHERY OF PIPE EMBEDDED IN CONCRETE (TYP. ALL STRUCTURES THIS SHEET) SEE STD DWG NO 30



Size	Single Pipe			Dual Pipe		
	sq. ft. wire reinforcing mesh	ft. no. 4 bar	cu. yds. concrete	sq. ft. wire reinforcing mesh	ft. no. 4 bar	cu. yds. concrete
48"	223	475	4.5	331	770	6.7
54"	232	493	4.7	346	805	7.1
60"	242	510	5.0	362	840	7.4
72"	249	575	5.1	382	970	7.9

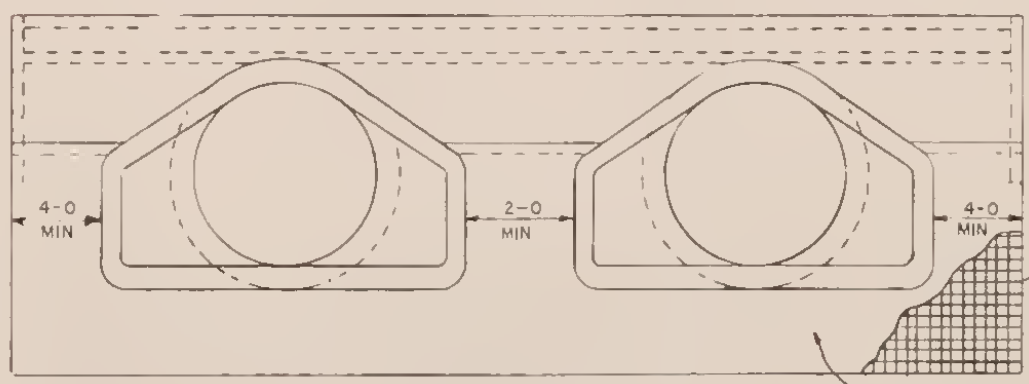
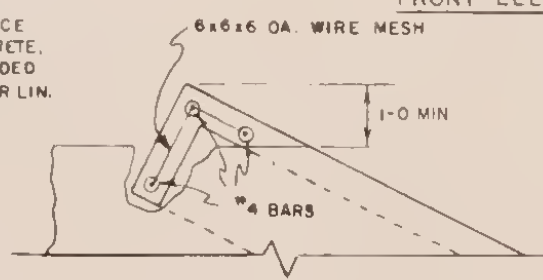
* FOR ESTIMATING PURPOSES ONLY
QUANTITIES INCLUDE CUTOFF WALL AND EDGE PROTECTION

PIPE CULVERT



CL. "DD" CONCRETE OR EQUAL, REINFORCED MAT'L TO BE INCLUDED IN THE UNIT PRICE BID PER CU. YDS. OF CONCRETE. ANCHOR BOLTS TO BE INCLUDED IN THE UNIT PRICE BID PER LIN. FT. OF PIPE CULVERT.

3/4" Ø ANCHOR BOLTS @ APT. 18" CENTERS AROUND ENTIRE PERIPHERY OF PIPE EMBEDDED IN CONCRETE (TYP. ALL STRUCTURES THIS SHEET) SEE STD DWG NO 30



FRONT ELEVATION MULTIPLE PIPES

Size	Single Pipe			Dual Pipe		
	sq. ft. wire reinforcing mesh	ft. no. 4 bar	cu. yds. concrete	sq. ft. wire reinforcing mesh	ft. no. 4 bar	cu. yds. concrete
48"	258	47.5	5.2	368	75.5	7.4
54"	241	49.3	4.9	343	79.0	7.0
60"	227	50.5	4.7	319	81.5	6.6
72"	256	54.0	5.2	369	88.5	7.6
84"	277	57.2	5.7	403	95.0	8.3

* FOR ESTIMATING PURPOSES ONLY
QUANTITIES INCLUDE CUTOFF WALL AND EDGE PROTECTION

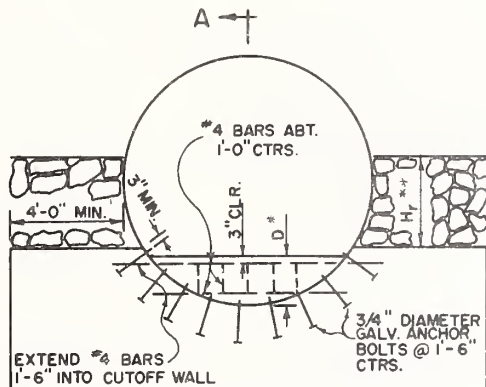
STANDARD DRAWING

REFERENCE: DWG NO. 32
STANDARD SPEC. SECTION 73

CONCRETE EDGE PROTECTION FOR CONCRETE CULVERTS

APPROVED H. J. ANDERSON - DIRECTOR OF HIGHWAYS
BY [Signature] ADMINISTRATOR - ENGINEERING DIVISION

REVISED
EFFECTIVE 3/1/72



ELEVATION

NOTE: SEE STD. DWG. NO. 30
FOR ANCHOR BOLT DETAILS.

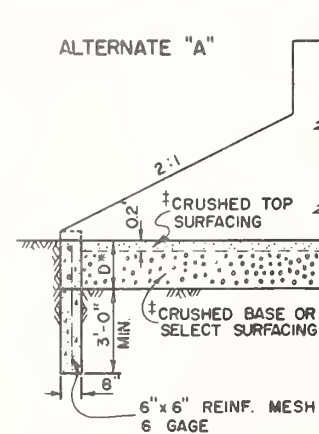
* H_r = HEIGHT OF RIPRAP (SEE ROAD PLAN)

† ON THE DESIGN 102, THE BACKFILL MATERIAL SHALL BE CRUSHED
TOP SURFACING ONLY.

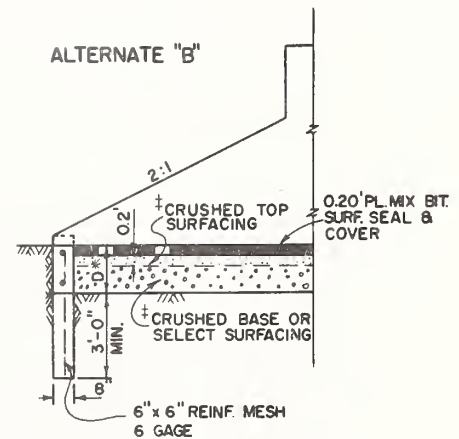
DIAMETER (inches)	D*
102	0.8'
126	1.2'
162	2.2'
180	2.0'
198	2.6'
210	1.6'

DIAMETER (inches)	CONCRETE QUANTITIES (CU. YDS.)		
	BACKFILL RETAINER	CUTOFF WALL	TOTAL CONCRETE
102	0.1	1.7	1.8
126	0.2	2.0	2.2
162	0.4	2.8	3.2
180	0.4	3.1	3.5
198	0.6	3.5	4.1
210	0.3	3.3	3.6

NOTE: CONCRETE SHALL BE CLASS "DD" OR EQUAL.
CONCRETE QUANTITIES ARE FOR ONE END ONLY.
REINFORCING MATERIAL TO BE INCLUDED IN UNIT PRICE BID PER CU. YD. CONC.
ANCHOR BOLTS TO BE INCLUDED IN THE UNIT PRICE BID PER LIN. FT. PIPE.



ALTERNATE "B"



SECTION A-A

SURFACING QUANTITIES PER' LINEAL FOOT									
DIAMETER (inches)	ALTERNATE "A"		ALTERNATE "B"						
	CUBIC YARDS		TON		CUBIC YARD		TONS BITUM. MAT'L.		
	TOP SURF.	CR. BASE OR SEL. SURF.	COVER MAT'L.	PLANT MIX	TOP SURF.	CR. BASE OR SEL. SURF.	PRIME	PLANT MIX	SEAL
102	0.100	—	—	—	—	—	—	—	—
126	0.047	0.156	0.0093	0.096	0.045	0.111	0.0009	0.0062	0.0009
162	0.073	0.489	0.0139	0.146	0.069	0.408	0.0014	0.0095	0.0014
180	0.073	0.446	0.0142	0.148	0.071	0.375	0.0014	0.0096	0.0014
198	0.088	0.712	0.0167	0.176	0.084	0.627	0.0017	0.0114	0.0017
210	0.074	0.333	0.0140	0.141	0.067	0.267	0.0014	0.0092	0.0014

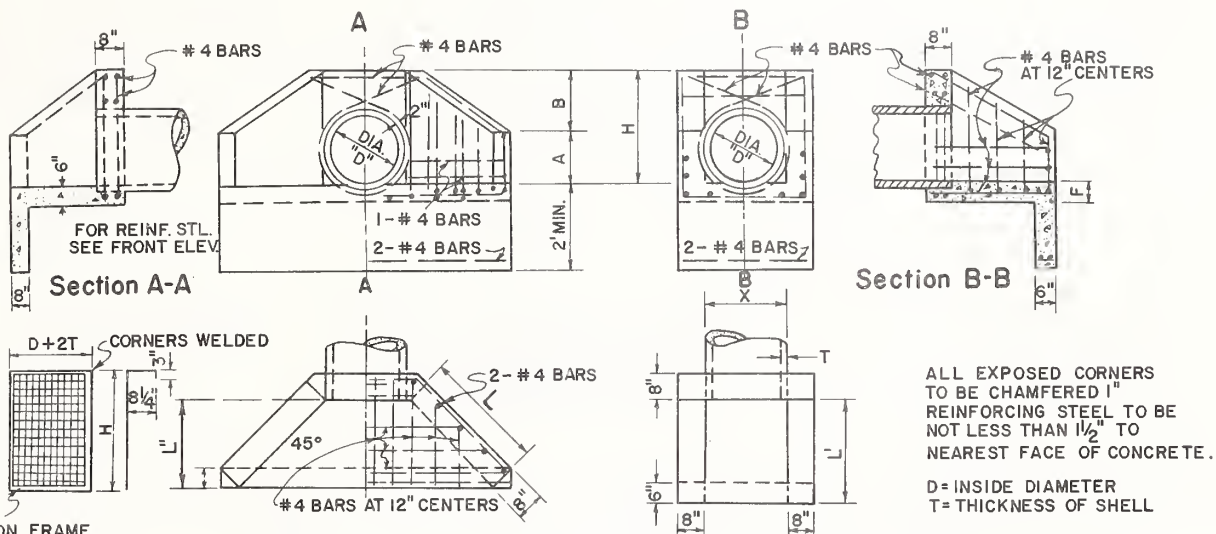
STANDARD DRAWING

REFERENCE: DWG. NO. 33
STANDARD SPEC.
SECTION 51

BACKFILL RETAINER AND CUTOFF WALL
FOR VEHICULAR UNDERPASS

APPROVED: H. L. ANDERSON - DIRECTOR OF HIGHWAYS
BY: Jack R. B. *[Signature]*
ADMINISTRATOR - ENGINEERING DIVISION

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EFFECTIVE 3/1/72



1" x 1/4" STRAP IRON FRAME
3/4" MESH GALVANIZED SCREEN
SOLDERED TO IRON FRAME.
INLET SCREEN (NOT TO BE USED
UNLESS RECOMMENDED BY THE
ENGINEER) TO BE ABSORBED IN
THE UNIT PRICE BID FOR LINEAR
FEET OF PIPE.

INLET HEADWALL

OUTLET HEADWALL

INLET & OUTLET HEADWALLS FOR R.C.P.											
CULVERT		CL. "DD" CONC. OR EQUAL (Cu Yds)		REINF. STEEL LBS.		DIMENSION TABLE					
DIA. "D"	AREA SQ. FT.	IN-LET	OUT-LET	IN-LET	OUT-LET	L	L'	A	B	X	L"
18"	1.77	.80	.60	65	53	2'-6"	2'-2"	1'-3"	1'-3"	1'-11"	6.5"
24"	3.14	1.00	.86	85	69	3'-0"	2'-6"	1'-6"	1'-6"	2'-6"	7"
30"	4.91	1.42	1.14	104	85	3'-6"	2'-10"	1'-9"	1'-9"	3'-1"	7.5"
36"	7.07	1.84	1.43	126	101	4'-0"	3'-2"	2'-0"	2'-0"	3'-8"	8"
42"	9.62	2.12	1.73	150	117	4'-6"	3'-6"	2'-3"	2'-3"	4'-3"	8.5"
48"	12.57	2.34	2.07	175	134	5'-0"	3'-10"	2'-6"	2'-6"	4'-10"	9"

INLET & OUTLET HEADWALLS FOR C.M.P.											
CULVERT		CL. "DD" CONC. OR EQUAL (Cu Yds)		REINF. STEEL LBS.		DIMENSION TABLE					
DIA. "D"	AREA SQ. FT.	IN-LET	OUT-LET	IN-LET	OUT-LET	L	L'	A	B	H	L"
18"	1.77	.73	.59	62	50	2'-6"	2'-2"	1'-3"	1'-3"	2'-6"	1'-9"
24"	3.14	.91	.76	82	54	3'-0"	2'-6"	1'-6"	1'-6"	3'-0"	2'-1"
30"	4.91	1.06	.95	99	66	3'-6"	2'-10"	1'-9"	1'-9"	3'-6"	2'-6"
36"	7.07	1.68	1.11	116	82	4'-0"	3'-2"	2'-0"	2'-0"	4'-0"	2'-10"
42"	9.62	2.10	1.40	139	105	4'-6"	3'-6"	2'-3"	2'-3"	4'-6"	3'-2"
48"	12.57	2.32	1.66	162	124	5'-0"	3'-10"	2'-6"	2'-6"	5'-0"	3'-6"

REINFORCING STEEL AS INDICATED TO BE INCLUDED IN THE UNIT PRICE BID PER CUBIC YARD OF CONCRETE.

STANDARD DRAWING

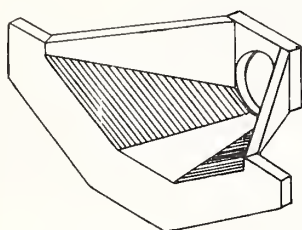
REFERENCE: DWG. NO.
STANDARD SPEC. 34
SECTION 73

INLET AND OUTLET HEADWALLS FOR
R.C.P. AND C.M.P. PIPES

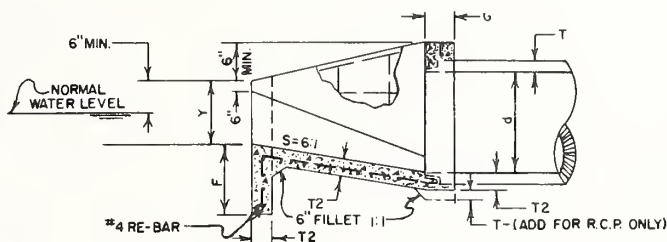
APPROVED: H. J. ANDERSON - DIRECTOR OF HIGHWAYS
BY: *[Signature]*
ADMINISTRATOR - ENGINEERING DIVISION

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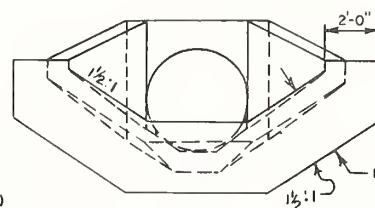
3/1/72



PICTORIAL VIEW OF TRANSITION



SECTION B-B

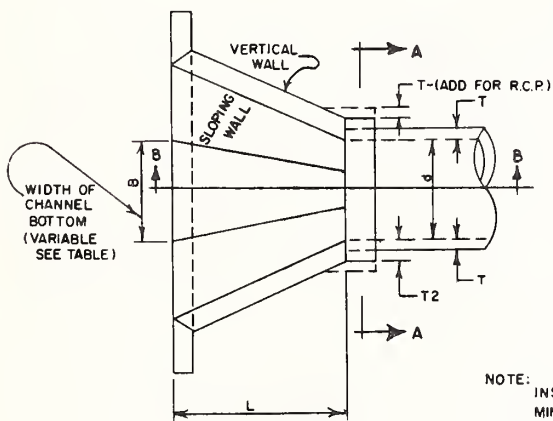


ELEVATION

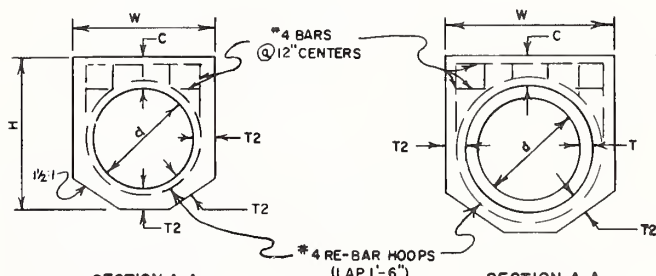
PLACE RE-BAR IN CENTER OF WALLS, SLAB, ETC. UNLESS OTHERWISE NOTED.

NOTE: SPACING REINFORCING BAR ABOUT 12" EACHWAY THROUGHOUT STRUCTURE. USE CONTINUOUS BARS IN FLOORS AND WALLS WHENEVER POSSIBLE. WHEN SPLICES ARE MADE, LAP REINFORCING BAR 1'-6".

NOTE: TRASHRACKS WILL BE PROVIDED WHEN REQUIRED, SEE STD. DWG. NO. 36.



PLAN VIEW



SECTION A-A
FOR C.M.P.

SECTION A-A
FOR R.C.P.

ALL EXPOSED CORNER TO BE CHAMFERED 1".

NOTE: INSTALL STRUCTURE A MINIMUM OF 30' FT. FROM NEAREST DRIVING LANE.

INLET & OUTLET CONCRETE TRANSITIONS FOR C.M.P.															
CULVERT		DIMENSIONS (FT.-IN.)							QUANTITIES						
DIA "d"	AREA SQ. FT.	F	G	H	L	T2	W	C	Y	B=d			B=d+1'-0"		
										B	CL "DD" CONC. CU. YDS.	#4 RE-BAR LBS.	B	CL "DD" CONC. CU. YDS.	#4 RE-BAR LBS.
18"	1.77	2-0	0-8	2-10	3-0	0-6	2-9	0-10	1-3	1-6	0.8	65	2-6	0.9	72
24"	3.14	2-0	0-8	3-4	4-0	0-6	3-3	0-10	1-6	2-0	1.1	90	3-0	1.2	98
30"	4.91	2-0	0-8	3-9	5-0	0-6	3-9	0-10	1-9	2-6	1.5	118	3-6	1.6	126
36"	7.07	2-6	0-8	4-4	6-0	0-6	4-3	0-10	2-0	3-0	2.0	164	4-0	2.2	174
42"	9.62	2-6	0-8	4-10	7-0	0-6	4-9	0-10	2-3	3-6	2.5	202	4-6	2.7	213
48"	12.57	2-6	0-10	5-6	8-0	0-8	5-3	0-10	2-6	4-0	4.0	252	5-0	4.2	264

INLET & OUTLET CONCRETE TRANSITIONS FOR R.C.P.																			
CULVERT		DIMENSIONS (FT.-IN.)									QUANTITIES								
INSIDE DIA.	INSIDE AREA SQ.FT.	F	G	H	L	T	T2	W	C	Y	B=d		B=d+1'-0"		B=d+2'-0"				
											B	CL"DD" CONC. CU.YDS.	#4 RE-BAR LBS.	B	CL"DD" CONC. CU.YDS.	#4 RE-BAR LBS.	B	CL"DD" CONC. CU.YDS.	#4 RE-BAR LBS.
18"	1.77	2-0	0-8	3-3	3-0	0-2 1/2	0-6	3-2	0-10	1-3	1-6	0.9	70	2-6	0.9	76	3-6	1.0	84
24"	3.14	2-0	0-8	3-10	4-0	0-3	0-6	3-9	0-10	1-6	2-0	1.2	96	3-0	1.3	105	4-0	1.4	113
30"	4.91	2-0	0-8	4-4	5-0	0-3 1/2	0-6	4-4	0-10	1-9	2-6	1.6	128	3-6	1.7	136	4-6	1.8	145
36"	7.07	2-6	0-8	5-0	6-0	0-4	0-6	4-11	0-10	2-0	3-0	2.2	176	4-0	2.3	186	5-0	2.4	197
42"	9.62	2-6	0-8	5-7	7-0	0-4 1/2	0-6	5-6	0-10	2-3	3-6	2.7	218	4-6	2.8	229	5-6	3.0	241
48"	12.57	2-6	0-10	6-4	8-0	0-5	0-8	6-1	0-10	2-6	4-0	4.3	271	5-0	4.5	283	6-0	4.7	296

REINFORCING STEEL AS INDICATED TO BE INCLUDED IN THE UNIT PRICE BID PER CUBIC YARD OF CONCRETE.

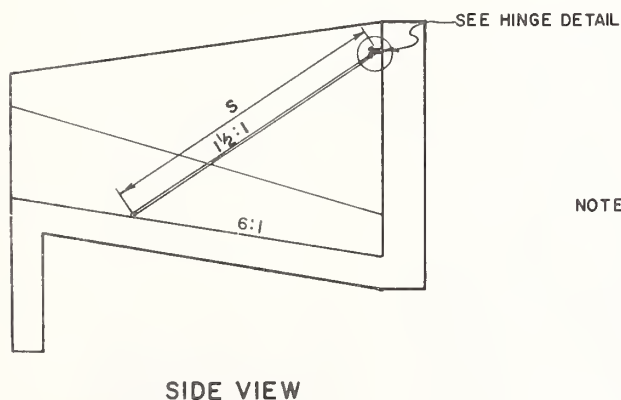
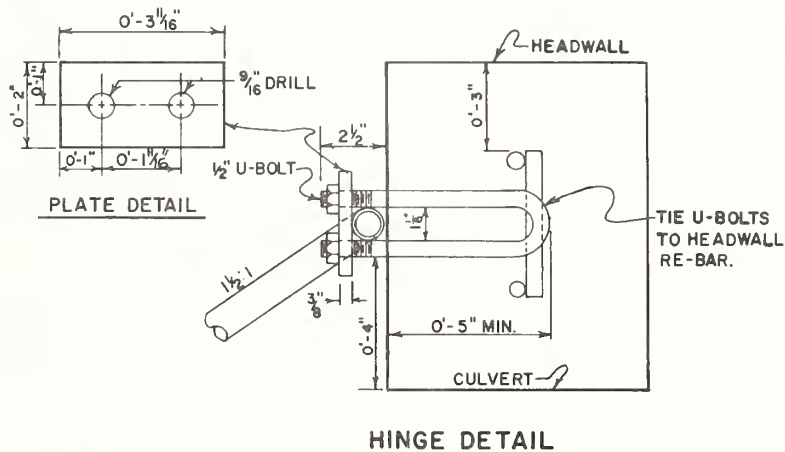
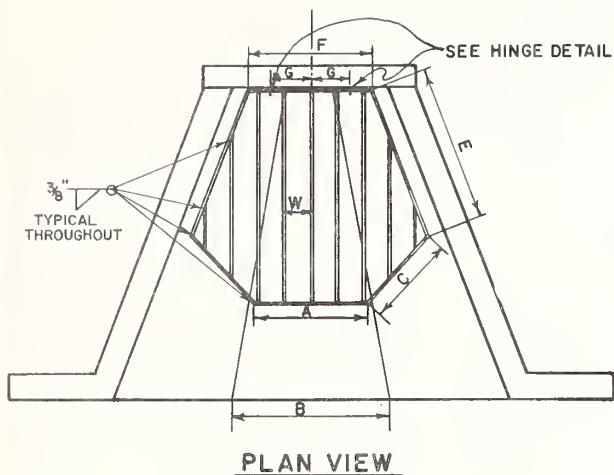
STANDARD DRAWING

REFERENCE: DWG. NO. 35
STANDARD SPEC. SECTION 73

CONCRETE IRRIGATION INLET AND OUTLET TRANSITION FOR R.C.P. AND C.M.P. PIPES

APPROVED: H. J. ANDERSON - DIRECTOR OF HIGHWAYS
BY: *[Signature]*
ADMINISTRATOR - ENGINEERING DIVISION

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EFFECTIVE 3/1/72



- * $\frac{3}{8}$ " DIA EXTRA STRONG GALV. STEEL PIPE.
(OUTSIDE DIA. = 1.050")
(INSIDE DIA. = 0.742")
(PIPE = 1.47 LB/LINEAR FT.)
OR
* $\frac{5}{8}$ " DIA REINFORCING BAR
(RE-BAR = 1.043 LB/LINEAR FT.)

NOTE:
PAINT ALL WELDS AND OTHER NON-GALVANIZED PARTS IN ACCORDANCE WITH STANDARD SPECS. 91." PAINTS AND PAINTING."
USE OF PIPE OR RE-BAR FOR TRASHGUARD TO BE DETERMINED BY THE ENGINEER.
W= CENTER TO CENTER PIPE OR RE-BAR SPACING.

CULVERT DIA. "d" INCHES	DIMENSIONS (F.T.)							B (F.T.-IN.)	B = d	
	A	C	E	F	S	W	G		$\frac{3}{8}$ " G.S.P. OR #5 RE-BAR (F.T.)	$\frac{1}{2}$ " U-BOLT (NO.) (WITH PLATE)
18	1.10	.95	2.04	.80	2.76	.33	.25	1-6	19.6	2
24	1.45	1.20	2.55	1.30	3.46	.50	.50	2-0	24.5	2
30	1.83	1.60	3.13	1.75	4.32	.50	.75	2-6	36.6	2
36	2.19	1.95	3.62	2.25	5.02	.50	.90	3-0	49.3	2
42	2.58	2.23	4.15	2.78	5.75	.67	1.20	3-6	52.4	2
48	2.90	2.41	4.60	3.30	6.70	.67	1.50	4-0	62.3	2

CULVERT DIA. "d" INCHES	DIMENSIONS (F.T.)							B (F.T.-IN.)	B = d + 1'-0"	
	A	C	E	F	S	W	G		$\frac{3}{8}$ " G.S.P. OR #5 RE-BAR (F.T.)	$\frac{1}{2}$ " U-BOLT (NO.) (WITH PLATE)
18	1.85	.88	2.18	.75	2.76	.33	.25	2-6	23.7	2
24	2.19	1.15	2.62	1.25	3.46	.50	.50	3-0	27.7	2
30	2.60	1.51	3.22	1.70	4.32	.50	.70	3-6	39.5	2
36	2.90	1.85	3.71	2.25	5.02	.50	.90	4-0	53.3	2
42	3.23	2.20	4.20	2.75	5.75	.67	1.15	4-6	56.7	2
48	3.51	2.36	4.71	3.25	6.70	.67	1.45	5-0	65.4	2

CULVERT DIA. "d" INCHES	DIMENSIONS (F.T.)							B (F.T.-IN.)	B = d + 2'-0"	
	A	C	E	F	S	W	G		$\frac{3}{8}$ " G.S.P. OR #5 RE-BAR (F.T.)	$\frac{1}{2}$ " U-BOLT (NO.) (WITH PLATE)
18	2.62	.83	2.25	.70	2.76	.33	.20	3-6	27.5	2
24	2.81	1.10	2.85	1.20	3.46	.50	.45	4-0	32.0	2
30	3.28	1.42	3.32	1.65	4.32	.50	.65	4-6	43.6	2
36	3.60	1.78	3.78	2.20	5.02	.50	.90	5-0	57.2	2
42	3.92	2.15	4.32	2.72	5.75	.67	1.15	5-6	60.3	2
48	4.14	2.30	4.80	3.20	6.70	.67	1.45	6-0	67.7	2

DIMENSIONS AND QUANTITIES ARE FOR ESTIMATING PURPOSES ONLY.

STANDARD DRAWING

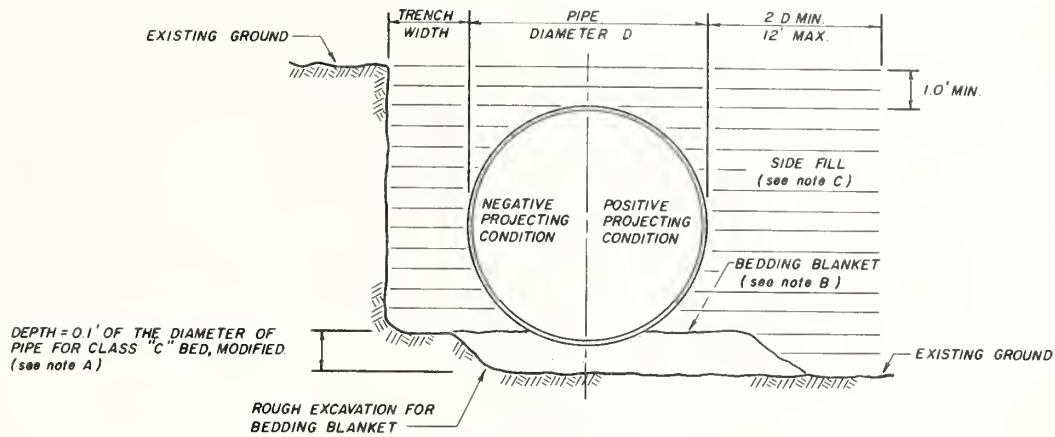
REFERENCE: DWG. NO. 36
STANDARD SPEC.
SECTION 73

TRASHGUARD FOR CONCRETE IRRIGATION INLET AND OUTLET TRANSITION STRUCTURES

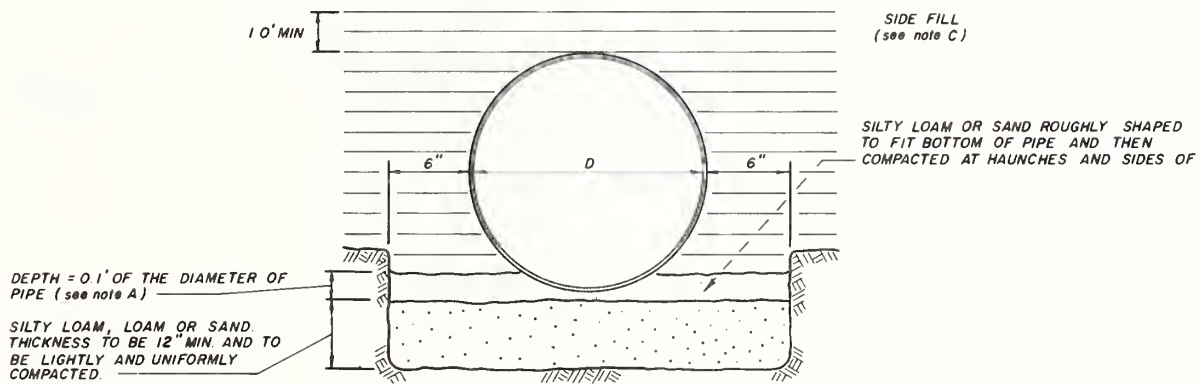
APPROVED: H. J. ANDERSON, DIRECTOR OF HIGHWAYS
BY: *Jack R. Baker*
ADMINISTRATOR - ENGINEERING DIVISION

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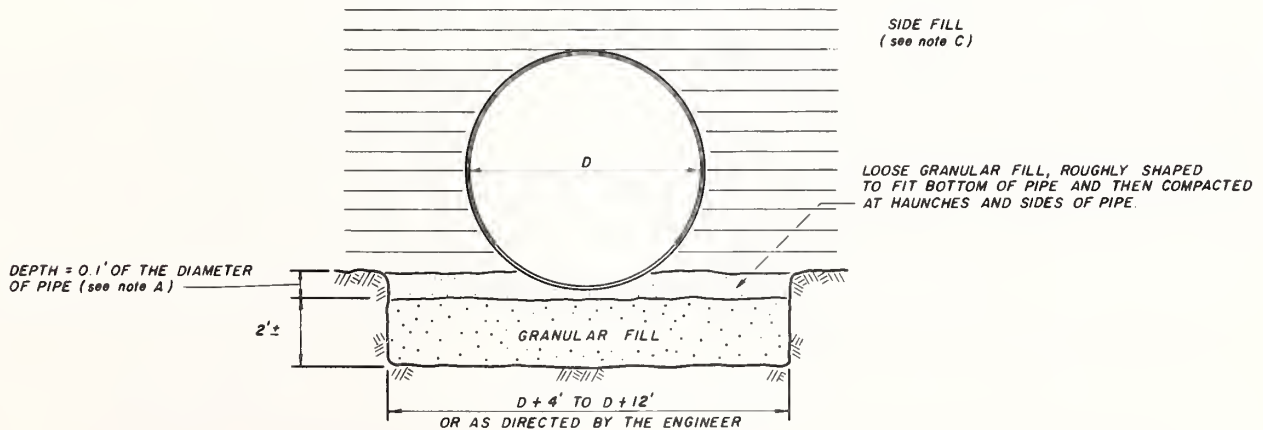
1-PIPE INSTALLATION AND BEDDING (CLASS C, MODIFIED)



2-ROCK



3-FOUNDATION STABILIZATION



NOTES

- (A) FOR STRUCTURAL PLATE PIPE, THE LENGTH OF BEDDING ARC NEED NOT EXCEED WIDTH OF BOTTOM PLATE.
- (B) BEDDING BLANKET OF SILTY LOAM OR SAND ROUGHLY SHAPED TO FIT BOTTOM OF PIPE. MINIMUM THICKNESS BEFORE PLACING PIPE IS 3"
- (C) SIDE FILL TO BE COMPACTED IN 6" LAYERS TO DENSITY SPECIFIED FOR ADJACENT EMBANKMENT. SEE ARTICLE 11.05 OF STANDARD SPECIFICATIONS FOR THE DENSITY REQUIREMENTS

STANDARD DRAWING

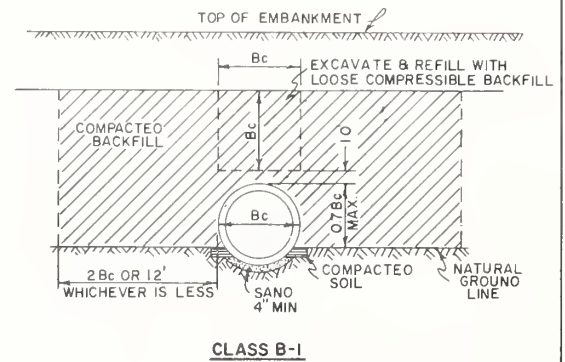
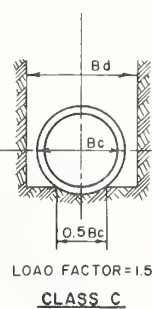
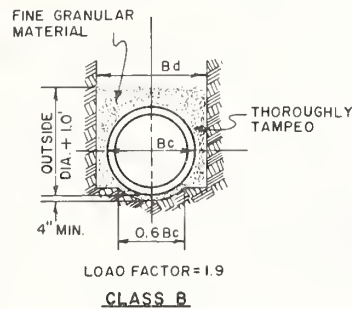
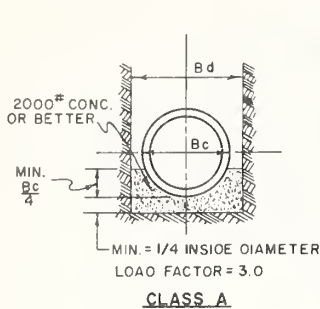
REFERENCE	DWG. NO
STANDARD SPEC.	40
SECTION 54	

C.S.P. & S.S.P.P.
CULVERT BEDDING

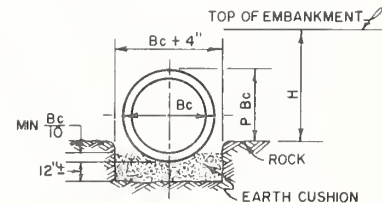
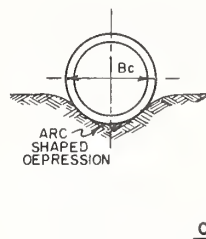
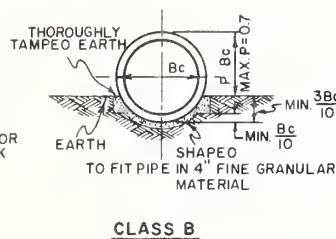
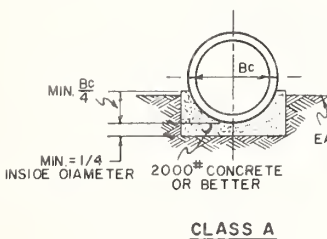
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BY: [Signature]
ADMINISTRATOR - ENGINEERING DIVISION

TYPES OF TRENCH BEDDING



TYPES OF EMBANKMENT BEDDING



DESCRIPTION OF BEDDING CLASSES

CLASS A CONCRETE CRADLE BEDDING. The lower part of the pipe exterior shall be bedded in a continuous cradle constructed of 2000 pound concrete or better, having a minimum thickness under the pipe of one-fourth the nominal inside diameter and extending up the sides of the pipe for a height equal to one-fourth of the outside diameter. The cradle shall have a width at least equal to the outside diameter of the pipe plus 8" and it shall be constructed monolithically without horizontal construction joints.

CLASS B BEDDING. (1) This class of bedding for embankment condition is applicable only when the projection ratio is not greater than 0.7. The pipe shall be carefully bedded on fine granular materials over an earth foundation, accurately shaped by means of a template to fit the lower part of the pipe exterior for at least 10% of the culvert overall height. Compactable soil material shall then be rammed and tamped in layers not more than 6" thick, around the pipe for the remainder of the lower 20% of its height. Backfilling to the top of the pipe shall conform with the applicable provisions of the standard specifications.

(2) For trench conditions, the culvert is placed as described in B (1) except that the earth foundation needs to be shaped to fit the lower part of the culvert exterior for a width of at least 60% of the culvert breadth. Then the remainder of the culvert is entirely surrounded to a height of at least 12" above its top by granular material placed by hand to fill all spaces under and adjacent to the culvert. The fill is tamped thoroughly on each side and under the culvert as far as practicable in layers not to exceed 6" in thickness.

CLASS B-1 BEDDING. In this type of installation, sometimes called The Imperfect Trench Method, the pipe culvert shall be first installed in accordance with the requirements of B (2). Then the fill shall be compacted at each side of the pipe for a lateral distance equal to twice the outside diameter or 12', whichever is less, and carried up to an elevation above the top of the pipe equal to the outside diameter of the pipe plus 12". Next a trench equal in width to the outside diameter of the pipe shall be dug in the fill directly over the culvert, down to an elevation 12" above the top of the pipe. Care shall be exercised to keep the sides as vertical as possible.

After the trench is excavated, it shall be refilled with loose, highly compressible soil material. Straw, hay, leaves, brush or sawdust may be used to fill the lower one-fourth to one-third of the trench in order to insure high compressibility of this backfill. The backfill of straw, hay, etc. shall not be carried closer than 10' to the outside slope of the fill; the outside 10' shall be composed of impervious material, thoroughly compacted. After the backfill is completed, the balance of the fill shall be constructed by normal methods up to the finished grade of embankment.

CLASS C BEDDING. For projecting embankment culvert, this method of bedding is bedded with "ordinary" care in an earth foundation shaped in the form of an arc to fit the lower part of the culvert exterior with reasonably closeness for at least 10% of its overall height. The remainder of pipe shall be surrounded by material placed by hand tools to fill completely all spaces under and adjacent to the pipe. Backfilling to the top shall then be completed as specified in the standard specifications. If the culvert is placed on rock foundations, projecting embankment culvert pipes are bedded on an earth cushion having a minimum allowable thickness of 12" ± and with the earth foundation carefully shaped and filled around the culvert the same as ordinary projecting embankment bedding on an earth foundation.

CLASS C-1 BEDDING. The pipe shall be installed in accordance with Class C Bedding. The imperfect trench method shall then be used as described under Class B-1 Bedding.

When natural ground material simulates bedding material, no special bedding material need be used. Use Class "C" unless otherwise noted on plans.

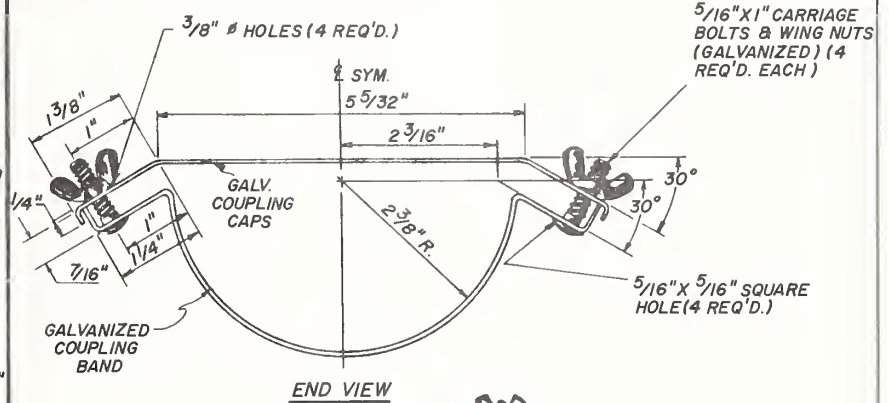
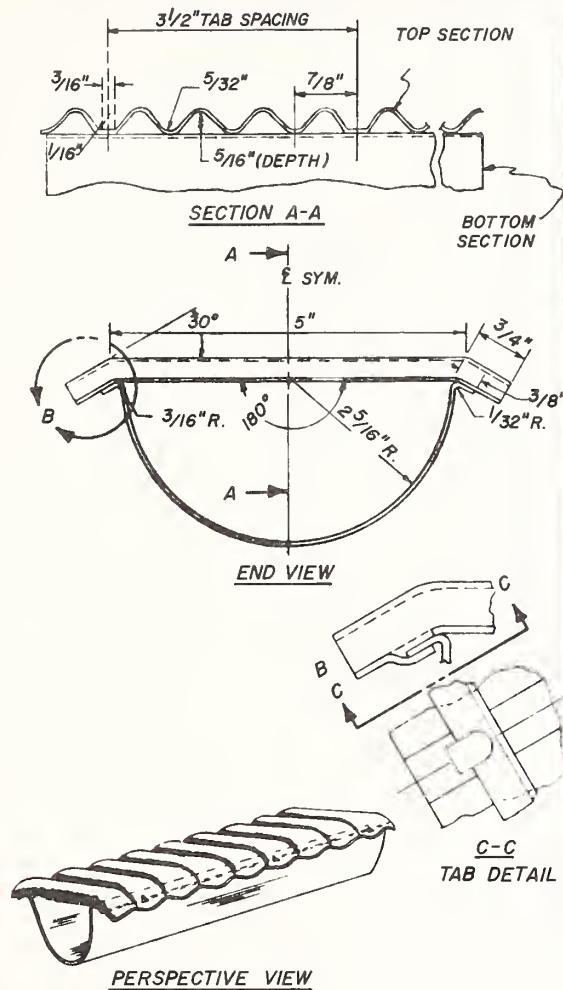
STANDARD DRAWING

REFERENCE DWG. NO.
STANDARD SPEC. 41
SECTION 54

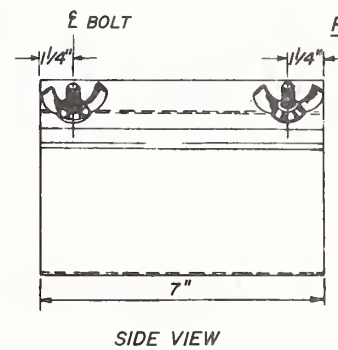
R.C.P.
CULVERT BEDDING

REVISED
EFFECTIVE 3/1/72

APPROVED: H. J. ANDERSON - DIRECTOR OF HIGHWAYS
BY: *[Signature]*
ADMINISTRATOR - ENGINEERING DIVISION



NOTE: DIMENSIONS MAY VARY ACCORDING TO THE COMMERCIAL AVAILABILITY OF THE PRODUCT.



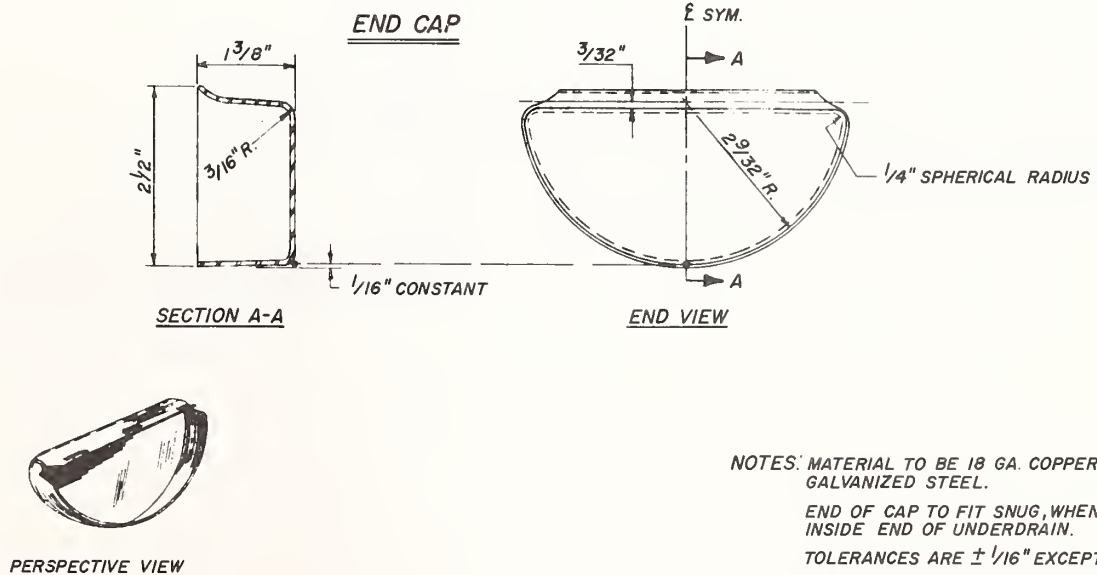
PERSPECTIVE VIEW

NOTES: ALL MATERIAL SHALL BE 0.052"

SUBDRAIN PIPE SECTIONS SHALL CONFORM TO A.A.S.H.O. M-136-65

GALVANIZING OF NUTS, BOLTS, END SCREEN, END CAP AND OTHER LIKE PARTS SHALL CONFORM TO A.S.T.M. A 153.

COUPLING BAND DETAILS



NOTES: MATERIAL TO BE 18 GA. COPPER BEARING GALVANIZED STEEL.

END OF CAP TO FIT SNUG, WHEN INSERTED INSIDE END OF UNDERDRAIN.

TOLERANCES ARE $\pm 1/16$ " EXCEPT AS SHOWN.

1/2" GALV. MESH SCREEN, SHAPED LIKE THE CAP, TO BE PROVIDED FOR EACH PIPE OUTLET.

STANDARD DRAWING

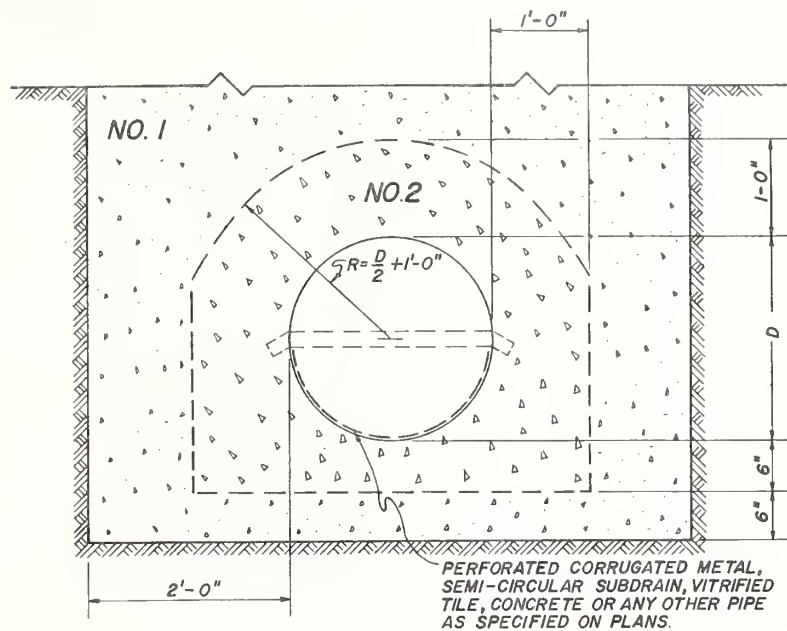
REFERENCE: DWG. NO. 42
STANDARD SPEC. SECTION 69

SEMICIRCULAR UNDERDRAIN

APPROVED: H. A. ANDERSON - DIRECTOR OF HIGHWAYS
BY: [Signature]
ADMINISTRATOR - ENGINEERING DIVISION

REVISED
EFFECTIVE 3/1/72

FOR PERFORATED CORRUGATED METAL PIPE, SEMI-CIRCULAR
SUBDRAIN OR *OPEN JOINT CONCRETE PIPE



NOTE: USE PULLBOARDS OF D+6" HEIGHT TO
SEPARATE NO. 1 & NO. 2 MATERIAL DURING
PLACEMENT AND THEN REMOVE.

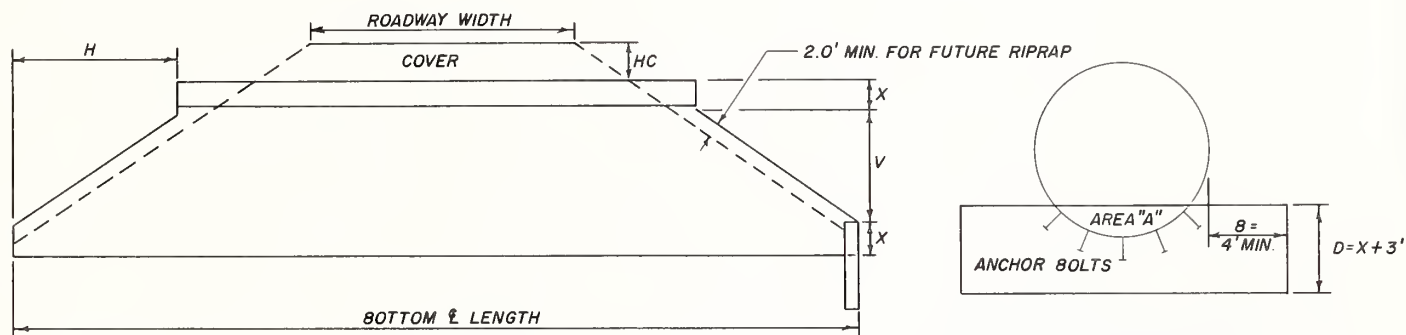
FILTER GRADATION	PERCENT PASSING STD. A.S.T.M. SIEVE											
	2	1 1/2	1 1/4	1	3/4	1/2	3/8	NO. 4	8	16	50	100
NO. 1							100	95-100	65-95	35-80	5-30	0-10
NO. 2	100	95-100	70-95		35-70		10-30	0-5				

* NOTE: WHEN OPEN JOINT PIPE IS USED JOINT SHOULD BE WRAPPED
WITH BRASS, BRONZE OR COPPER NO. 4 MESH HARDWARE
CLOTH BEFORE FILTER MATERIAL IS PLACED.

BOTH GRADATIONS SHALL BE COMBINED AND BID AS "FILTER
MATERIAL."

STANDARD DRAWING	
REFERENCE:	DWG. NO.
STANDARD SPEC.	43
SECTION 54	
FILTER MATERIAL FOR UNDERDRAINS	
APPROVED: H. J. ANDERSON - DIRECTOR OF HIGHWAYS	
BY: <i>[Signature]</i>	
ADMINISTRATOR - ENGINEERING DIVISION	

REVISED	
EFFECTIVE	3/1/72



NOTE: FOR DETAILS, SEE STANDARD DWG. NO. 30
COVERING CUTOFF WALLS

NOTE: SEE APPLICABLE STANDARD DRAWING
OF THICKNESS TABLES FOR MAXIMUM
& MINIMUM HEIGHT OF COVER

DIA. (IN.)	X * (FT.)	H IN FEET FOR BEVELS OF:		V * (FT.)	AREA "A" SQ. FT.
		15:1	2:1		
48	1.000	3.000	4.000	2.000	2.46
54	1.125	3.375	4.500	2.250	3.11
60	1.250	3.750	5.000	2.500	3.83
66	1.375	4.125	5.500	2.750	4.44
72	1.500	4.500	6.000	3.000	5.53
78	1.625	4.875	6.500	3.250	6.61
84	1.750	5.250	7.000	3.500	7.51
90	1.875	5.625	7.500	3.750	8.61
96	2.000	6.000	8.000	4.000	9.81
102	2.125	6.375	8.500	4.250	11.08
108	2.250	6.750	9.000	4.500	12.42
114	2.375	7.125	9.500	4.750	13.84
120	2.500	7.500	10.000	5.000	15.38
126	2.625	7.875	10.500	5.250	16.98
132	2.750	8.250	11.000	5.500	18.50

DIA. (IN.)	X * (FT.)	H IN FEET FOR BEVELS OF:		V * (FT.)	AREA "A" SQ. FT.
		1.5:1	2:1		
138	2.875	8.625	11.500	5.750	20.30
144	3.000	9.000	12.000	6.000	22.10
150	3.125	9.375	12.500	6.250	24.00
156	3.250	9.750	13.000	6.500	25.9
162	3.375	10.125	13.500	6.750	27.9
168	3.500	10.500	14.000	7.000	30.1
174	3.625	10.875	14.500	7.250	32.2
180	3.750	11.250	15.000	7.500	34.5
192	4.000	12.000	16.000	8.000	39.3
198	4.125	12.375	16.500	8.250	41.7
204	4.250	12.750	17.000	8.500	44.2
210	4.375	13.125	17.500	8.750	46.9
216	4.500	13.500	18.000	9.000	49.7
228	4.750	14.250	19.000	9.500	55.5
240	5.000	15.000	20.000	10.000	61.5
252	5.250	15.750	21.000	10.500	67.7

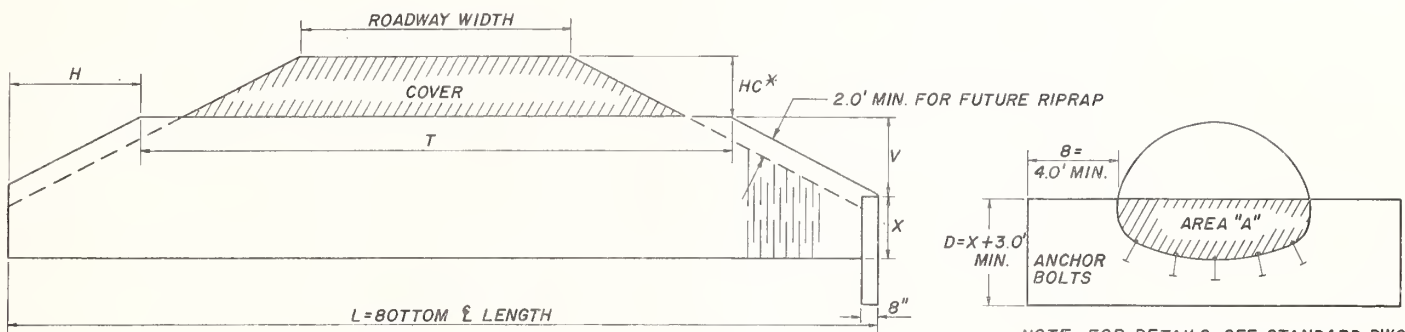
TOLERANCE OF $\pm 4\%$ WILL BE ALLOWED IN ALL DIMENSIONS.

USE SKEW ENDS WHEN SKEW IS GREATER THAN 15° BUT NOT GREATER THAN 45° .

* FOR ELLIPTICAL PIPE, INCREASE VERTICAL DIMENSIONS 8% PERCENT OF ELLIPSE.

STANDARD DRAWING	
REFERENCE:	DWG. NO.
STANDARD SPEC.	44
SECTION 59	
STEP BEVEL FOR CIRCULAR C.S.P. & S.S.P.	
APPROVED: H. J. ANDERSON - DIRECTOR OF HIGHWAYS	
BY: Jack R. Rickett	
ADMINISTRATOR - ENGINEERING DIVISION	

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EFFECTIVE	3/1/72



TOLERANCE OF $\pm 4\%$ WILL BE ALLOWED IN ALL DIMENSIONS.
USE SKEW ENDS WHEN SKEW IS GREATER THAN 15° BUT NOT GREATER THAN 45° .

$$* HC = \frac{S}{4} \text{ OR A MIN.} = 24"$$

HC MEASURED VERTICALLY FROM FINISHED LOW SHOULDER TO TOP OF PIPE.

IF POSSIBLE IT IS DESIRABLE THAT TOP OF PIPE BE PLACED A MIN. OF 1.0' BELOW SUBGRADE SURFACE.

SPAN	RISE	EQUIV. DIA.	H IN FEET FOR BEVELS OF			V	X	AREA "A"
			1 1/2:1	2:1	2 1/2:1			
18" CORNER PLATES								
6'-1"	4'-7"	66	3.5	4.7	5.8	2.3	2.3	12
6'-9"	4'-11"	72	3.8	5.0	6.3	2.5	2.4	14
7'-3"	5'-3"	78	4.8	6.3	7.9	3.2	2.1	14
7'-11"	5'-7"	84	5.1	6.8	8.5	3.4	2.2	15
8'-7"	5'-11"	90	5.4	7.2	8.9	3.6	2.3	17
9'-4"	6'-3"	96	5.7	7.7	9.5	3.8	2.4	19
9'-9"	6'-7"	102	6.8	8.8	11.0	4.4	2.2	19
10'-8"	6'-11"	108	6.3	8.3	10.4	4.2	2.8	25
11'-5"	7'-3"	114	6.6	8.8	11.0	4.4	2.8	27
11'-10"	7'-7"	120	7.7	10.2	12.7	5.1	2.5	26
12'-6"	7'-11"	126	7.9	10.5	13.1	5.3	2.7	29
12'-10"	8'-4"	132	9.0	12.0	15.0	6.0	2.3	25
31" CORNER PLATES								
14'-0"	9'-8"	144	9.6	12.8	16.0	6.4	3.3	38
15'-4"	10'-4"	156	10.2	13.6	17.0	6.8	3.5	44
16'-6"	11'-0"	168	11.4	15.2	19.0	7.6	3.4	47
17'-11"	11'-8"	180	12.2	16.2	20.2	8.1	3.6	53
19'-3"	12'-4"	192	12.8	17.0	21.2	8.5	3.8	60
20'-5"	13'-0"	204	13.8	18.4	23.0	9.2	3.8	63

STANDARD DRAWING

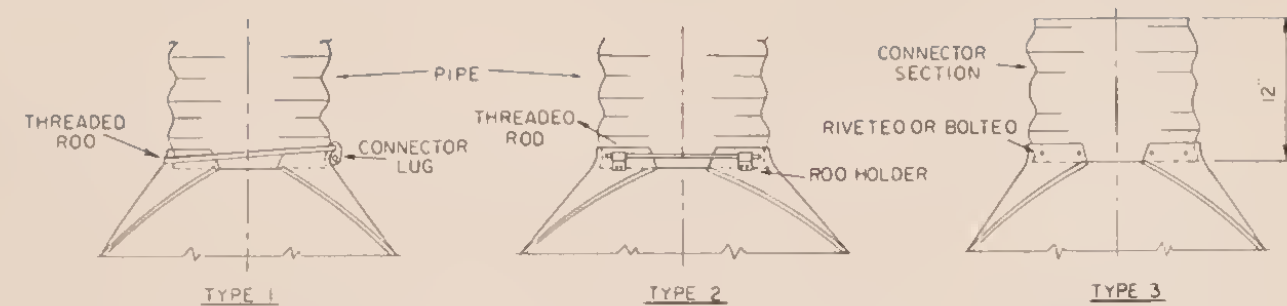
REFERENCE: DWG. NO. 45
STANDARD SPEC.
SECTION 59

BEVEL ON STRUCT. PLATE PIPE-ARCH

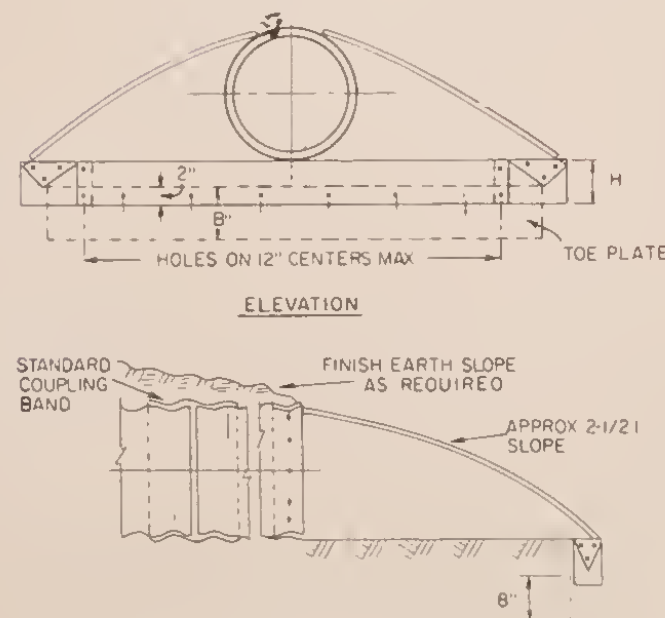
APPROVED: H. J. ANDERSON - DIRECTOR OF HIGHWAYS
BY: *Jack R. Baker*
ADMINISTRATOR - ENGINEERING DIVISION

REVISED
EFFECTIVE 3/1/72

CONNECTIONS



ROUND PIPE

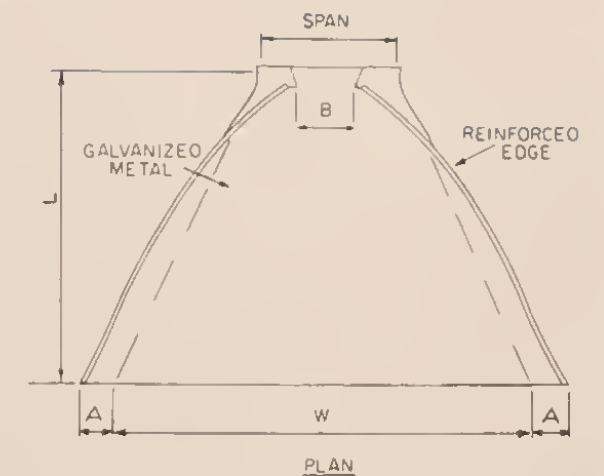
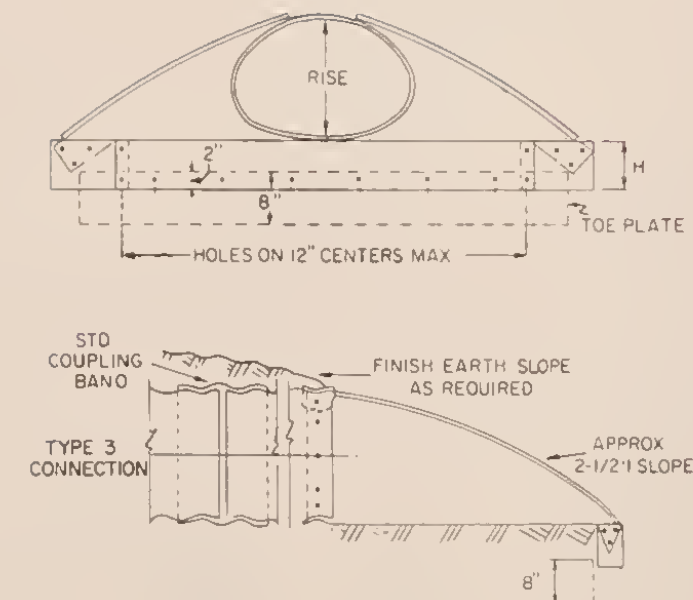


TYPICAL CROSS-SECTION

(ILLUSTRATED WITH TYPE 3 CONNECTION)

PIPE DIAM	MIN THICK- NESS	DIMENSIONS					Type Connector
		A 1" Tol	B Max	H 1" Tol	L 1 1/2" Tol	W 2" Tol	
12"	0.064	6	6	6	21	24	1
15"	0.064	7	8	6	26	30	1
18"	0.064	8	10	6	31	36	1
21"	0.064	9	12	6	36	42	1
24"	0.064	10	13	6	41	48	1
30"	0.079	12	16	8	51	60	2
36"	0.079	14	19	9	60	72	2
42"	0.109	16	22	11	69	84	3
48"	0.109	18	27	12	78	90	3
54"	0.109	18	30	12	84	102	3
60"	0.109	18	33	12	87	114	3
66"	0.109	18	36	12	87	120	3
72"	0.109	18	39	12	87	126	3
78"	0.109	18	42	12	87	132	3
84"	0.109	18	45	12	87	138	3

ARCH PIPE



PIPE-ARCH DIMENSION	MIN THICK- NESS	DIMENSIONS					TYPE CONN
		A 1" Tol	B Max	H 1" Tol	L 1 1/2" Tol	W 2" Tol	
18 11	0.064	7	9	6	19	30	2
22 13	0.064	7	10	6	23	36	2
25 16	0.064	8	12	6	28	42	2
29 18	0.064	9	14	6	32	48	2
36 22	0.079	10	16	6	39	60	2
43 27	0.079	12	19	8	46	75	2
50 31	0.109	13	21	9	53	85	2
58 36	0.109	18	26	12	63	90	2
65 40	0.109	18	30	12	70	102	3
72 44	0.109	18	33	12	77	114	3
79 49	0.109	18	36	12	77	126	3
85 54	0.109	18	36	12	77	138	3

FLARED END TERMINAL SECTION TO BE INCLUDED IN LENGTH OF PIPE SHOWN ON PLANS.

ALL PARTS ARE TO BE GALVANIZED IN ACCORDANCE WITH AASHTO M-36.

ANY AREAS WHERE GALVANIZING IS BROKEN OR METAL IS BARE SHALL BE PAINTED WITH ONE COAT OF RED LEAD OR ZINC CHROMATE PRIMER AND TWO COATS OF ALUMINUM PAINT.

MINOR VARIATIONS IN DESIGN MAY BE ACCEPTABLE ON APPROVAL OF THE ENGINEER. SEAMS OR JOINTS LENGTHWISE OF THE APRON WILL BE ACCEPTABLE IF SECURELY BOLTED OR WELDED AND PAINTED AS PROVIDED ABOVE.

FOR TYPE OF CONNECTION ON ARCH AND ROUND PIPE SEE DETAILS THIS SHEET.

STANDARD DRAWING

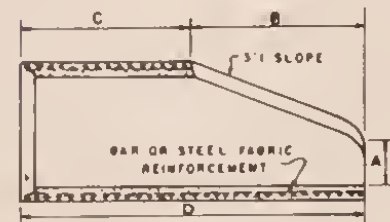
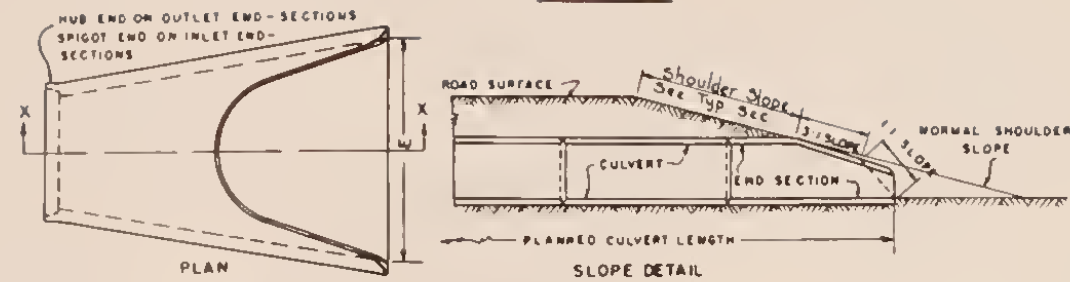
REFERENCE, DWG. NO.
STANDARD SPEC. 46
SECTION 56 AND 57

FLARED END TERMINAL SECTION
- CORRUGATED METAL PIPE -

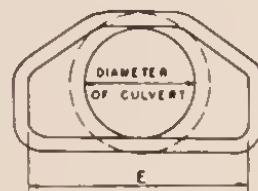
APPROVED BY *[Signature]* DIRECTOR OF HIGHWAYS
ADMINISTRATOR - ENGINEERING DIVISION

REVISED
EFFECTIVE 3/1/72

TYPE "A"



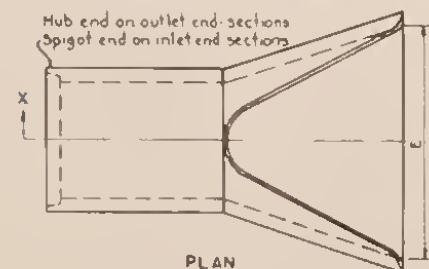
SECTION X-X



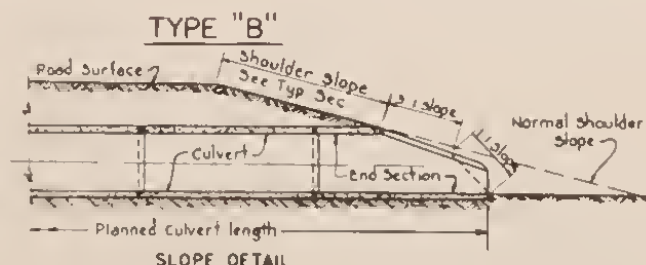
END VIEW

TYPE "A"					
TERMINAL SECTION DIMENSION					
DIAM.	A	B	C	D	E
12"	4"	2'-0"	4'-0 3/8"	6'-0 3/8"	2'-0"
15"	6"	2'-3"	3'-10"	6'-1"	2'-6"
18"	9"	2'-3"	3'-10"	6'-1"	3'-0"
24"	9 1/2"	3'-7 1/2"	2'-6"	6'-1 1/2"	4'-0"
30"	1'-0"	4'-6"	1'-7 3/4"	6'-1 3/4"	5'-0"
36"	1'-3"	5'-3"	2'-10 3/4"	8'-1 3/4"	6'-0"
42"	1'-9"	5'-3"	2'-11"	8'-2"	6'-6"
48"	2'-0"	6'-0"	2'-2"	8'-2"	7'-3"
54"	2'-3"	5'-5"	2'-11"	8'-4"	7'-6"

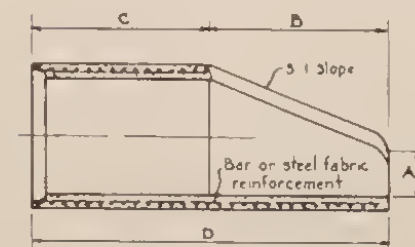
TYPE "B"					
TERMINAL SECTION DIMENSION					
DIAM.	A	B	C	D	E
12"	4"	2'-0"	4'-0 7/8"	6'-0 7/8"	2'-0"
15"	6"	2'-3"	3'-10"	6'-1"	2'-6"
18"	9"	2'-3"	3'-10"	6'-1"	3'-0"
24"	9 1/2"	3'-7 1/2"	2'-6"	6'-1 1/2"	4'-0"
30"	1'-0"	4'-6"	1'-7 3/4"	6'-1 3/4"	5'-0"
36"	1'-3"	5'-3"	2'-10 3/4"	8'-1 3/4"	6'-0"
42"	1'-9"	5'-3"	2'-11"	8'-2"	6'-6"
48"	2'-0"	6'-0"	2'-2"	8'-2"	7'-0"
54"	2'-3"	5'-5"	2'-9 1/4"	8'-2 1/4"	7'-6"



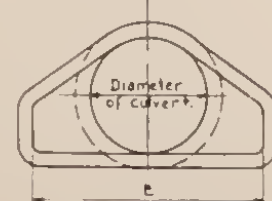
PLAN



SLOPE DETAIL

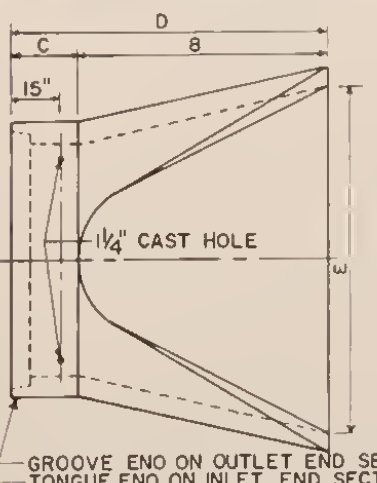
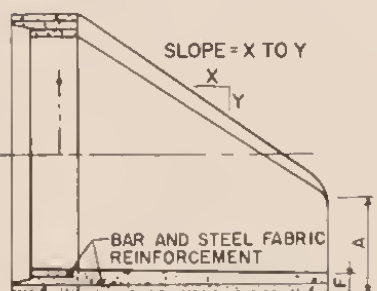
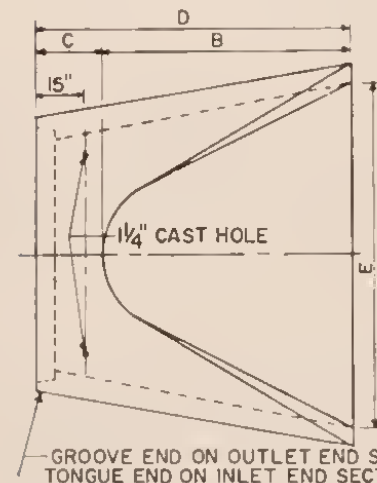
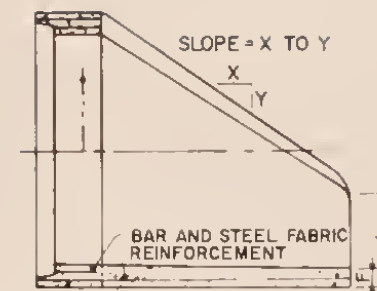


SECTION X-X

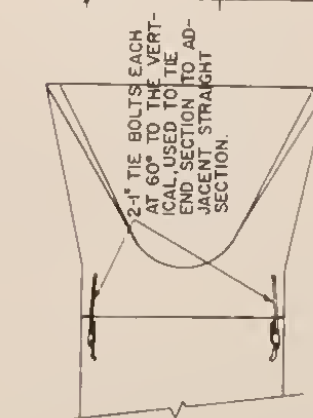
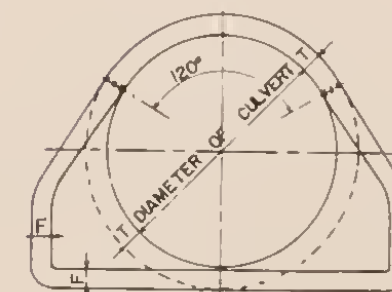
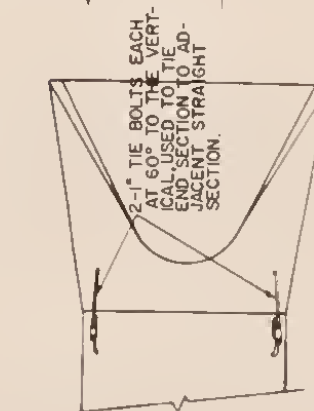
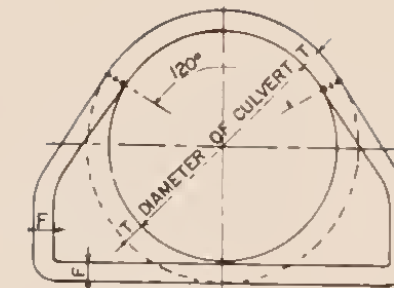


END VIEW

Tolerances, in the above tables, shall not vary more than $\pm 1.5\%$ for the dimensions shown. Otherwise they shall conform to AASHTO M-170.



GROOVE END ON OUTLET END SECTION
TONGUE END ON INLET END SECTION



DIAM.	SLOPE	T	A	B	C	D	E	F
60"	2:1	6"	2'11"	5'	3'3"	8'3"	8'	5"
72"	1.86:1	7"	3'	6'6"	1'9"	8'3"	9'	6"
84"	1.5:1	8"	3'	7'6 1/2"	1'9"	9'3 1/2"	10'	6 1/2"

TIE BOLTS. TIE BOLTS TO BE USED ON 72" AND 84" FLARED END SECTIONS. THREE TIE BOLTS, ONE AT TOP AND ONE ON EACH SIDE AT THE HORIZONTAL, SHALL BE USED WHEN REQUIRED. ALL PARTS SHALL BE GALVANIZED.

CONSTRUCTION. CONSTRUCTION SHALL CONFORM TO CLASS III, AASHTO M 170, AS FAR AS DESIGN WILL PERMIT.

FLARED END TERMINAL SECTIONS WILL BE INCLUDED IN LENGTH OF PIPE SHOWN ON PLANS.

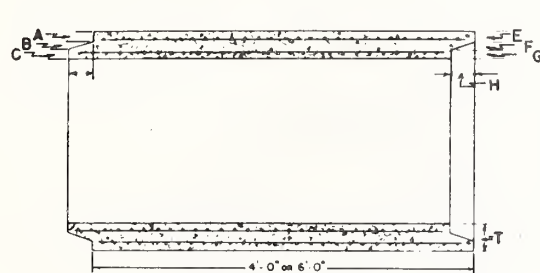
STANDARD DRAWING

REFERENCE. OWG NO. 47
STANDARD SPEC.
SECTION 62

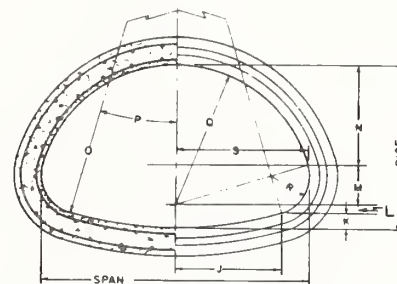
PREFABRICATED TERMINAL SECTION
FOR REINFORCED CONCRETE PIPE

APPROVED BY: J. H. ANDERSON - DIRECTOR OF HIGHWAYS
BY: J. R. B. - ADMINISTRATOR - ENGINEERING DIVISION

REVISED
EFFECTIVE 3/1/72



LONGITUDINAL SECTION



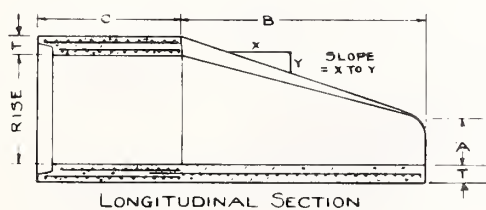
TRANSVERSE SECTION & END VIEW

SIZE	WATER AREA SQ. FT.	SPAN	RISE	As*	T	A	B	C	D	E	F	G	H	J	K	L	M	N	O	P	Q	R	S
18"	1.2	22"	13 1/2"	0.17	2 1/2"	1 1/8"	3/8"	3/4"	2"	1 1/8"	3/8"	1"	2"	7 1/8"	1"		6 1/4"	7 1/2"	27 1/2"	15"	13 3/4"	5 1/4"	9 1/4"
24"	2.8	28 1/2"	18"	0.25	3 1/2"	1 5/8"	1/2"	1 1/8"	3"	1 3/8"	1/2"	1 3/8"	3"	10 1/8"	1 1/8"	1 3/8"	2 1/8"	10 1/8"	40 1/8"	5 3/8"	14 3/8"	6 1/8"	14 1/8"
30"	4.4	36 1/4"	22 1/2"	0.22	4"	1 7/8"	5/8"	1 5/8"	3 1/2"	1 7/8"	5/8"	1 7/8"	3 1/2"	13 1/8"	1 1/8"	1 7/8"	2 1/8"	12 1/8"	51"	15 3/8"	18 1/8"	6 1/8"	17 1/8"
36"	6.4	43 1/4"	26 3/8"	0.23	4 1/2"	2"	3/4"	1 3/4"	4"	1 3/4"	3/4"	2"	4"	17 1/8"	2 1/8"	1 3/4"	6 1/4"	16 1/4"	62"	16"	22 1/4"	6 1/4"	21 1/8"
42"	8.8	51 1/8"	31 1/8"	0.30	4 1/2"	2"	3/4"	1 3/4"	4"	1 3/4"	3/4"	2"	4"	20"	2 1/8"	2 1/8"	1 3/4"	19 1/8"	3"	15 1/8"	26 1/4"	7 1/4"	25 1/4"
48"	11.4	58 1/2"	36"	0.33	5"	2 1/4"	3/4"	2"	5"	2"	3/4"	2 1/4"	5"	22 1/4"	3 1/8"	2 1/8"	8 1/8"	21 1/8"	84"	15 1/4"	30"	8 1/8"	28 1/8"
54"	14.3	65"	40"	0.37	5 1/2"	2 3/4"	3/4"	2"	5"	2 1/2"	3/4"	2 1/4"	5"	25 1/4"	3 1/2"	3"	9 1/8"	24 1/8"	92 1/2"	15 1/2"	33 1/8"	10"	32 1/2"
60"	17.7	71 1/2"	45"	0.40	6"	3 1/8"	1 1/4"	1 1/8"	5"	2 1/4"	3/4"	2 1/2"	5"	28 1/2"	3 1/8"	3 3/8"	10 1/8"	27 1/8"	105"	15 1/2"	37 1/2"	11 1/8"	36 1/8"
72"	25.6	88"	54"	0.59	7"	3 1/2"	1"	2 1/8"	6"	3 1/4"	1"	2 3/4"	6"	34 1/8"	4 1/2"	4 1/4"	12 1/4"	32 1/4"	126"	15 1/4"	45"	13 1/8"	43 1/8"

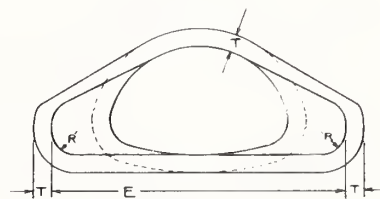
*As - MINIMUM REINFORCEMENT FOR EACH OF THE TWO LINES - STEEL AREA IN SQUARE INCHES PER LINEAL FOOT OF PIPE BARREL. A SINGLE LINE WILL BE USED IN 18" AND 24" SIZES.

CONCRETE STRENGTH IN TERMINAL SECTION SHALL BE EQUAL TO MIN. STRENGTH SPECIFIED FOR BARREL SECTION.

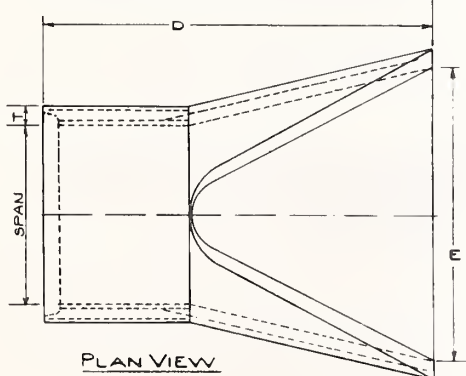
ASTM SPECIFICATIONS C-506 MAY TAKE PRECEDENCE OVER DIMENSIONS SHOWN ABOVE. SEE STANDARD SPEC. FOR OTHER REQUIREMENTS.



LONGITUDINAL SECTION



END VIEW



PLAN VIEW

SIZE	SPAN	RISE	T	A	B	C	D	E	R	SLOPE
18"	22"	13 1/2"	2 1/2"	8 1/2"	45"	2"	72"	36"	3"	3 TO 1
24"	28 1/2"	18"	3 1/2"	8 1/2"	39"	3 1/2"	72"	48"	3"	3 TO 1
30"	36 1/4"	22 1/2"	4"	9 1/2"	50"	46"	96"	60"	5"	3 TO 1
36"	43 1/4"	26 3/8"	4 1/2"	11 1/8"	60"	36"	96"	72"	6"	3 TO 1
42"	51 1/8"	31 1/8"	4 1/2"	15 1/8"	60"	36"	96"	78"	6"	3 TO 1
48"	58 1/2"	36"	5"	21"	60"	36"	96"	84"	6"	3 TO 1
54"	65"	40"	5 1/2"	23 1/2"	60"	36"	96"	90"	6"	3 TO 1
60"	71 1/2"	45"	6"	31"	60"	36"	96"	96"	6"	3 TO 1
72"	88"	54"	7"	31"	60"	39"	99"	120"	6"	2 TO 1

FLARED END TERMINAL SECTION WILL BE INCLUDED IN LENGTH OF PIPE SHOWN ON PLANS.

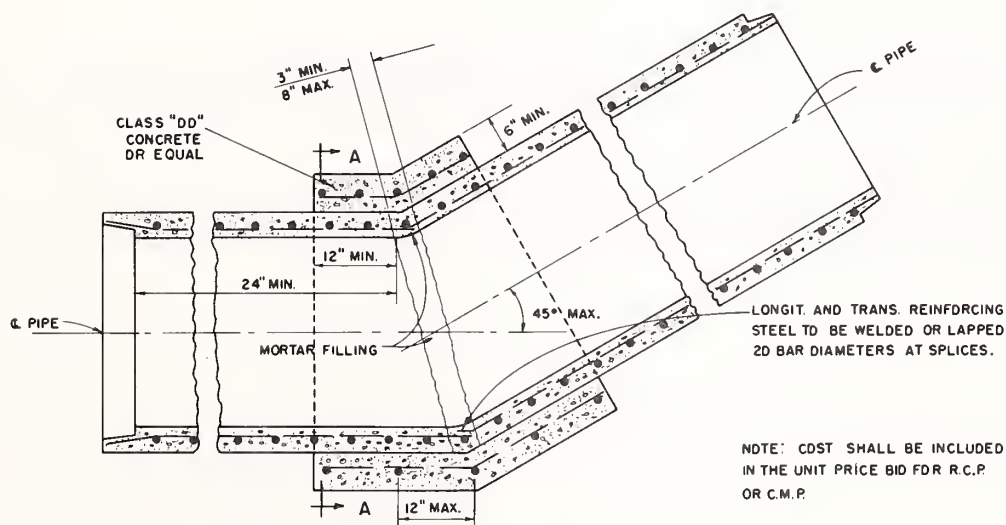
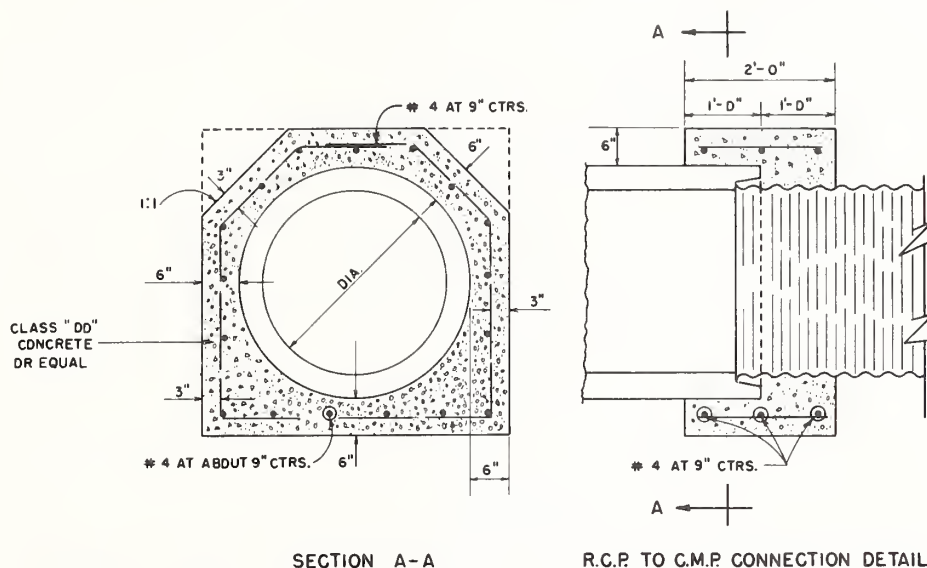
STANDARD DRAWING

REFERENCE: DWG. NO. 48
STANDARD SPEC.
SECTION 63

PREFABRICATED R.C.P. ARCH CULVERT
AND TERMINAL SECTION

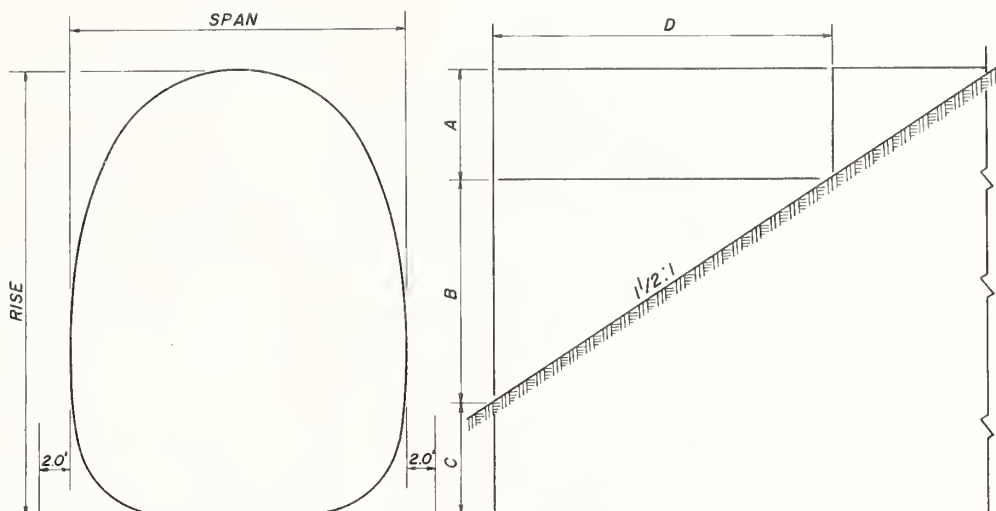
APPROVED: H. J. ANDERSON - DIRECTOR OF HIGHWAYS
BY: *John P. Anderson*
ADMINISTRATOR - ENGINEERING DIVISION

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STANDARD DRAWING	
REFERENCE:	DWG. NO.
STANDARD SPEC.	49
SECTION 54	
TYPICAL FIELD CAST CONCRETE BEND	
R.C.P. TO C.M.P. CONNECTION	
APPROVED: H. J. ANDERSON - DIRECTOR OF HIGHWAYS	
BY: <i>Josh R. Bickert</i>	
ADMINISTRATOR - ENGINEERING DIVISION	

REVISED	
EFFECTIVE	3/1/72



DIMENSIONS

DESIGN	SPAN	RISE	THICK.	A *	B *	C *	D *
A	5'-10"	6'-6"	0.138"	1'-4"	3'-10"	1'-4"	5'-9"
B	5'-10"	7'-7"	0.138"	1'-8"	4'-7"	1'-4"	6'-10"

DESIGN "A" STOCKPASS: THE TOP OF THE STOCKPASS SHALL BE AN ARC HAVING A RADIUS OF NOT LESS THAN 26 INCHES OR MORE THAN 30 INCHES AND SHALL NOT BE LESS THAN 100° OR MORE THAN 130°. THE SIDES SHALL BE ARCS HAVING A RADIUS OF NOT LESS THAN 60 INCHES OR MORE THAN 72 INCHES. CORNERS SHALL BE ARCS HAVING A RADIUS OF NOT LESS THAN 17 INCHES OR MORE THAN 20 INCHES. THE BOTTOM SHALL BE A FLAT SEGMENT NOT LESS THAN 29 INCHES OR MORE THAN 34 INCHES IN WIDTH.

DESIGN "B" STOCKPASS: THE TOP OF THE STOCKPASS SHALL BE AN ARC HAVING A RADIUS OF NOT LESS THAN 24 INCHES OR MORE THAN 30 INCHES AND SHALL NOT BE LESS THAN 110° OR MORE THAN 145°. THE SIDES SHALL BE ARCS HAVING A RADIUS OF NOT LESS THAN 85 INCHES OR MORE THAN 112 INCHES. CORNERS SHALL BE ARCS HAVING A RADIUS OF NOT LESS THAN 17 INCHES OR MORE THAN 20 INCHES. THE BOTTOM SHALL BE A FLAT SEGMENT NOT LESS THAN 29 INCHES OR MORE THAN 34 INCHES IN WIDTH.

* FOR DESIGN PURPOSES ONLY. BEVELING SHALL COMMENCE AT THE BOTTOM OF THE TOP PLATE AND EXTEND DOWNWARD ON A 1/2:1 SLOPE TO THE TOP OF THE CORNER PLATE.

A TOLERANCE OF $\pm 4\%$ IN SPAN & RISE WILL BE ACCEPTABLE.

THE LENGTH SHALL BE MEASURED ALONG THE FLOW LINE OF THE STOCKPASS, END TO END OF STRUCTURE.

UNLESS OTHERWISE CALLED FOR, END PLATES SHALL BE BEVELED AS SHOWN ABOVE, AND SHALL BE MEASURED AND PAID FOR AT THE UNIT PRICE BID PER LINEAL FOOT OF STRUCTURAL PLATE PIPE STOCKPASS. WHEN ENDS ARE BEVELED, THE ANGLE OF SKEW SHALL NOT EXCEED 15° UNLESS OTHERWISE NOTED.

SEE STANDARD DRAWINGS CONCERNING BEDDING MATERIAL BENEATH THE STRUCTURE.

SEE STANDARD DRAWINGS CONCERNING RIPRAP WHEN TOE PROTECTION IS NECESSARY.

MINIMUM COVER = 2.0 FT. TO FINISH GRADE.

MAXIMUM COVER = 6.0 FT. TO FINISH GRADE.

FILL SLOPES SHALL BE WARPED A MINIMUM OF 25.0' ON EACH SIDE OF THE STOCKPASS TO FIT THE END BEVEL.

NOTE: INLET AND OUTLET END TREATMENT FOR ALL STOCKPASSES SHALL PROVIDE FOR CONCRETE EDGE PROTECTION, CUTOFF WALLS AND BACKFILL RETAINING WALLS. A GRAVEL SURFACE SHALL BE PROVIDED FOR THE INSIDE OF STRUCTURE. IF STRUCTURE IS USED FOR DUAL PURPOSE OF STOCK AND DRAINAGE, ASPHALT SURFACING SHALL BE PROVIDED. SURFACING TO BE SLANTED TO ALLOW A DRAINAGE COURSE ALONG ONE SIDE.

BOLTS FROM BOTTOM CORNER PLATES TO TOP OF STRUCTURE SHALL BE PLACED WITH BOLT HEAD ON INSIDE.

STANDARD DRAWING

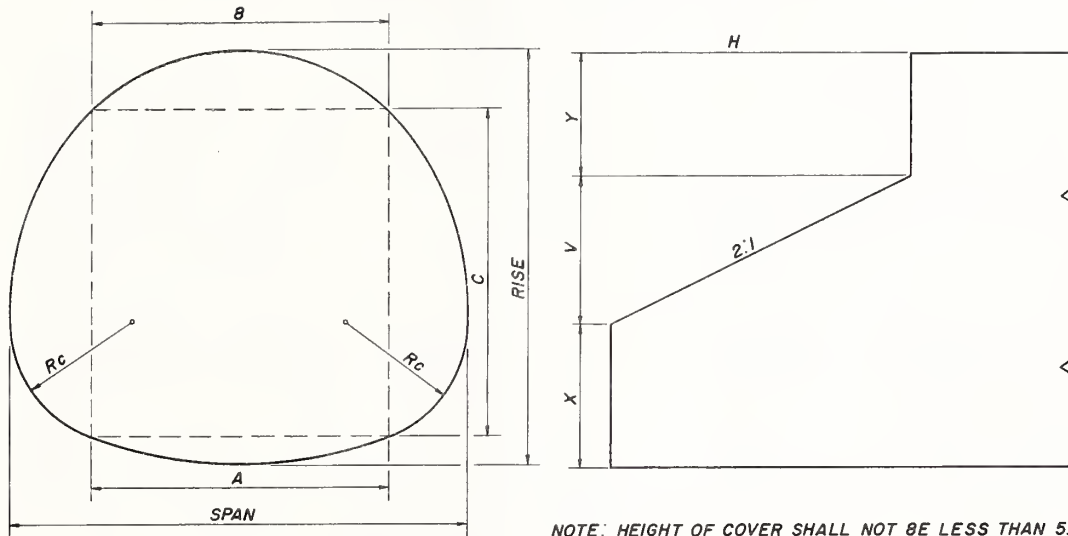
REFERENCE: DWG. NO.
STANDARD SPEC. 50
SECTION 59

STRUCTURAL PLATE PIPE STOCKPASS

APPROVED: H. J. ANDERSON - DIRECTOR OF HIGHWAYS
BY: *John R. B. B.*
ADMINISTRATOR - ENGINEERING DIVISION

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NOTE: STRUCTURES OF A SIMILAR DESIGN MAY BE USED IF APPROVED BY THE ENGINEER.



NOTE: HEIGHT OF COVER SHALL NOT BE LESS THAN 5.0 FEET.

SPAN (FT.-IN.)	RISE (FT.-IN.)	A (FT.)	B (FT.)	C (FT.)	H (FT.)	V (FT.)	X (FT.)	Y (FT.)
12-2	11-0	10	8	8	10	5	3.709	2.291
13-10	12-2	10	8	10	10	5	3.82	3.347
14-10	14-0	12	10	10.5	10	5	3.87	5.13
15-8	15-0	12	10	12	10	5	3.957	6.043
16-5	16-0	12	10	13	12	6	3.828	6.172
17-3	17-0	12	10	14	12	6	4.756	6.244
19-1	17-2	16	12	13	12	6	4.794	6.373
20-4	17-9	16	12	14	12	6	4.785	6.965

SPAN (FT.-IN.)	RISE (FT.-IN.)	RADIUS Rc (IN.)	MAXIMUM HEIGHT OF COVER IN FEET					
			0.138" THICK.	0.168" THICK.	0.188" THICK.	0.218" THICK.	0.249" THICK.	0.280" THICK.
12-2	11-0	38	17	19	20	22	25	27
13-10	12-2	38	15	17	18	20	21	23
14-10	14-0	38	14	15	16	18	20	22
15-8	15-0	38	13	14	15	17	19	21
16-5	16-0	38	12	12	13	14	15	16
17-3	17-0	47	11	12	12	13	14	15
19-1	17-2	47	10	10	11	12	13	14
20-4	17-9	47	9	10	10	11	12	13

NOTE: THESE STRUCTURES WILL BE DESIGNATED, IN PLANS AND PROPOSAL, AS "VEHICULAR UNDERPASS." MATERIALS, INSTALLATION AND OTHER PROVISIONS SHALL CONFORM TO THE STANDARD SPECIFICATIONS.

THE TERM "VEHICULAR UNDERPASS" WILL BE USED, REGARDLESS OF THE USE OR PURPOSE OF THE STRUCTURE.

INLET AND OUTLET END TREATMENT FOR ALL VEHICULAR UNDERPASSES SHALL PROVIDE FOR CONCRETE EDGE PROTECTION, CUTOFF WALLS AND BACKFILL RETAINING WALLS. SURFACING SHALL BE PROVIDED FOR THE INSIDE OF STRUCTURE. SURFACING TO BE SLANTED TO ALLOW A DRAINAGE COURSE ALONG ONE SIDE.

BOLTS FROM BOTTOM CORNER PLATES TO TOP OF STRUCTURE SHALL BE PLACED WITH BOLT HEAD ON INSIDE.

STANDARD DRAWING

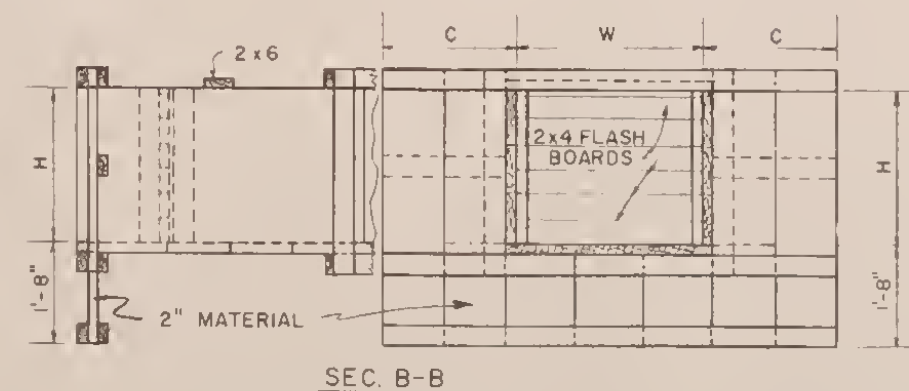
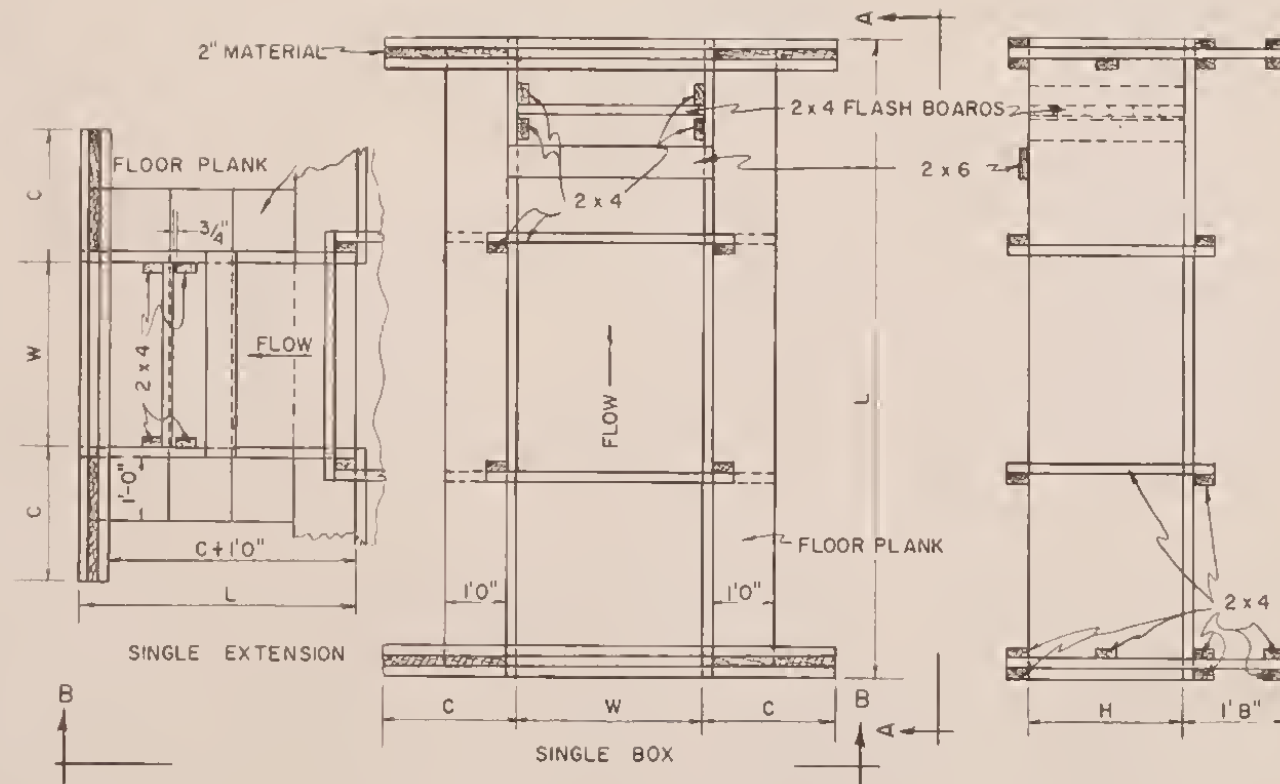
REFERENCE: DWG. NO. 51
STANDARD SPEC. SECTION 59

VEHICULAR UNDERPASS

APPROVED: H. J. ANDERSON - DIRECTOR OF HIGHWAYS
BY: *[Signature]*
ADMINISTRATOR - ENGINEERING DIVISION

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WOODEN



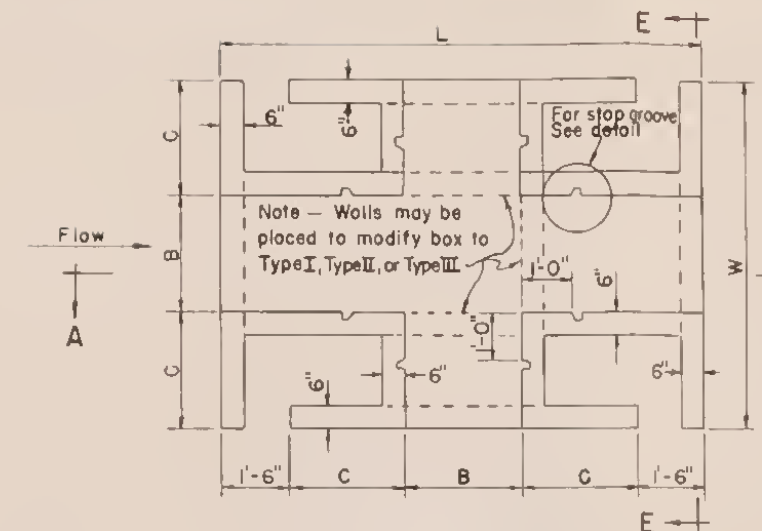
DIMENSIONS & MBM LUMBER										
	SINGLE BOX					SINGLE EXTENSION				
	W	H	C	L	MBM LUMBER	W	H	C	L	MBM LUMBER
1' 8"	1' 6"	1' 6"	2' 3"	9' 0"	268	1' 6"	1' 6"	2' 3"	3' 9"	112
24"	2' 0"	2' 0"	3' 0"	11' 0"	390	2' 0"	2' 0"	3' 0"	4' 6"	165
30"	2' 6"	2' 6"	3' 9"	13' 0"	580	2' 6"	2' 6"	3' 9"	5' 3"	223
36"	3' 0"	3' 0"	4' 6"	15' 0"	690	3' 0"	3' 0"	4' 6"	6' 0"	291

- 1-WAY = SINGLE BOX
- 2-WAY = SINGLE BOX + ONE EXTENSION
- 3-WAY = SINGLE BOX + TWO EXTENSIONS

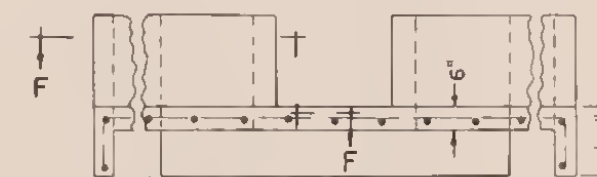
SIDES AND FLOOR TO BE OF S4S 2" MATCHED MATERIAL NAILS TO BE INCLUDED IN UNIT PRICE BID FOR LUMBER. ALL NAILS TO BE GALVANIZED.

WHEN THE PLANS PROVIDE FOR TREATED LUMBER, TREATMENT SHALL BE DONE BY IMMERSING THE LUMBER IN A SOLUTION CONTAINING 5% PENTA-CHLOROPHENOL. TREATMENT MUST BE DONE IN SUCH A MANNER AND WITH SUCH A CARRYING AGENT THAT THE PENTA WILL PENETRATE THE WOOD AT LEAST ONE-FOURTH INCH.

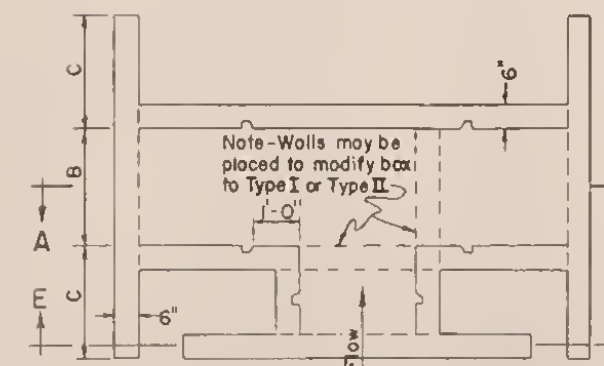
CONCRETE



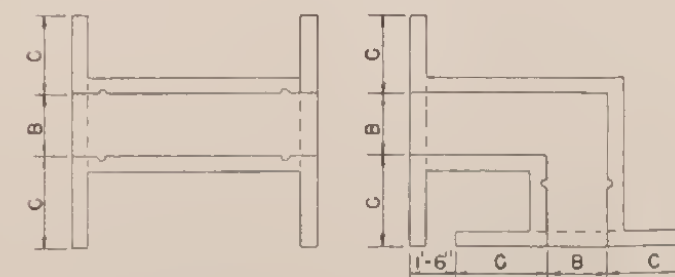
PLAN TYPE IV



SECTION A-A



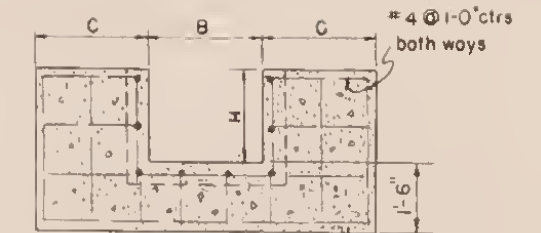
PLAN TYPE III



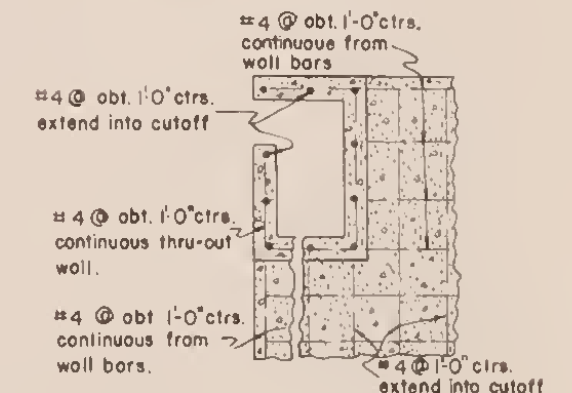
TYPE I

TYPE II

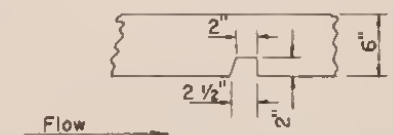
Note: Quantities for Type I and Type II are calculated from the dimensions given for 'L' for Type IV. Division box 'W' may be substituted for 'L' without re-computing quantities.



SECTION E-E



SECTION F-F



STOP GROOVE DETAIL

DIMENSIONS & QUANTITIES										
	B	C	H	L	W	00' CONC. OR EQUAL	LBS. REINF. STEEL			
TYPE I	2'-0"	3'-0"	2'-0"			2.2 CU.YD.	167.2			
	2'-6"	3'-6"	2'-0"			2.7	197.6			
	3'-0"	4'-0"	2'-6"			3.5	205.2			
TYPE II	2'-0"	3'-0"	2'-0"			2.0	152.0			
	2'-6"	3'-6"	2'-0"			2.5	190.0			
	3'-0"	4'-0"	2'-6"			3.3	250.8			
TYPE III	2'-0"	3'-0"	2'-0"	11'-0"	8'-0"	2.8	212.8			
	2'-6"	3'-6"	2'-0"	12'-6"	9'-6"	3.4	258.4			
	3'-0"	4'-0"	2'-6"	14'-0"	11'-0"	4.6	349.6			
TYPE IV	2'-0"	3'-0"	2'-0"	11'-0"	8'-0"	3.5	266.0			
	2'-6"	3'-6"	2'-0"	12'-6"	9'-6"	4.2	319.2			
	3'-0"	4'-0"	2'-6"	14'-0"	11'-0"	5.6	425.6			

Note - Oblivion Box may be modified if desired with dimensions shown on the plans. Reinforcing steel & Excavation shall be included in unit price bid for concrete, also the required flashboards.

-Quantities are for estimating purposes only.

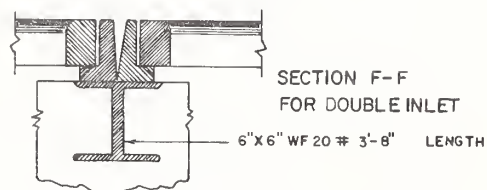
STANDARD DRAWING

REFERENCE. DWG. NO. 52
STANDARD SPEC. SECTION 73

STANDARD IRRIGATION DIVISION BOXES

APPROVED H. J. ANDERSON - DIRECTOR OF HIGHWAYS
BY: [Signature] ADMINISTRATOR - ENGINEERING DIVISION

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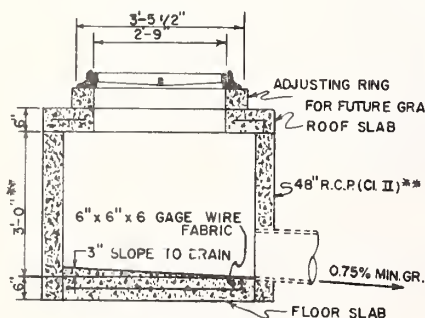
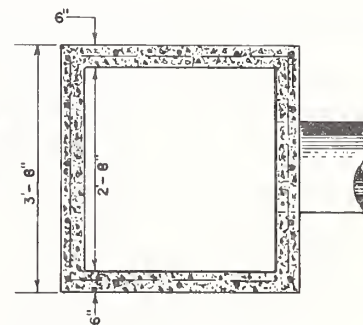
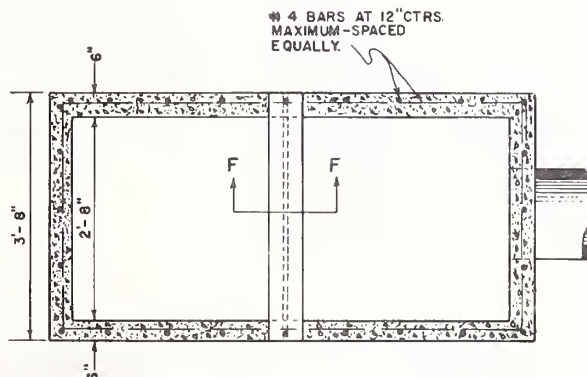
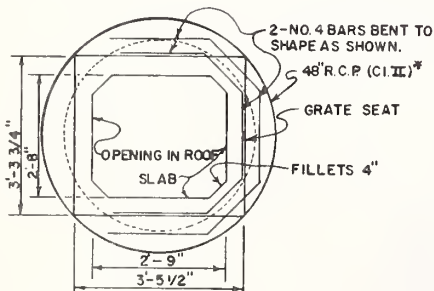


NOTE: GRATE TO BE INSTALLED WITH
BARS PARALLEL TO INTAKE FLOW.

* QUANTITIES

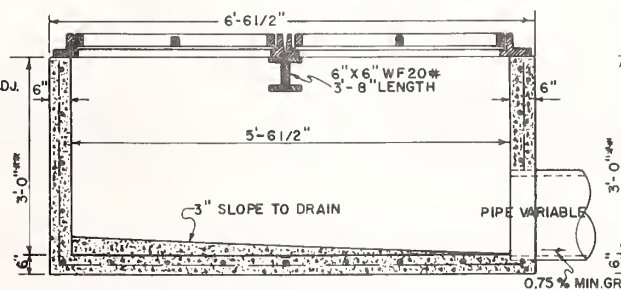
	CONCRETE	REIN. STL.
TYPE I	.45 CU. YDS.	40 LBS.
TYPE III	1.0 CU. YDS.	90 LBS.
TYPE II	1.5 CU. YDS.	145 LBS.

*QUANTITIES ARE FOR ESTIMATING ONLY.



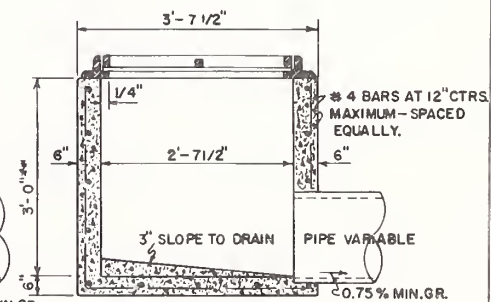
ROUND SINGLE DROP INLET

TYPE I



DOUBLE DROP INLET

TYPE II



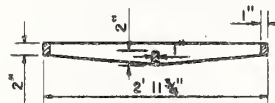
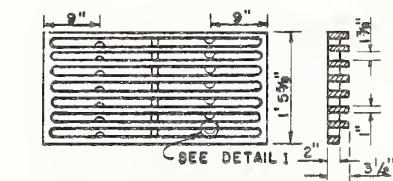
SINGLE DROP INLET

TYPE III

STANDARD EXCEPT AS OTHERWISE NOTED ON PLANS.

REVISED		2/15/73
EFFECTIVE	3/1/72	3/1/73

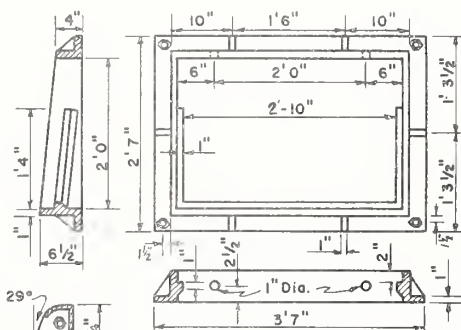
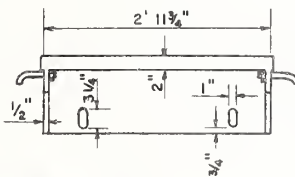
APPROVED: H. J. ANDERSON - DIRECTOR OF HIGHWAYS
BY Jack R. Baker
ADMINISTRATOR - ENGINEERING DIVISION



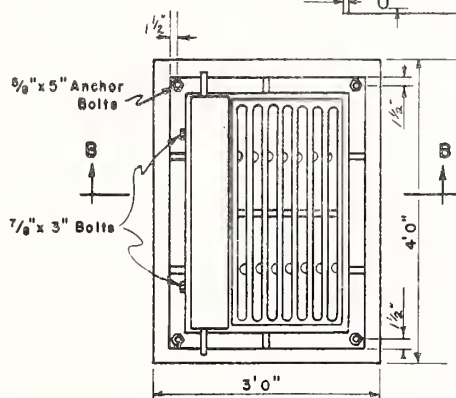
GRATE DETAILS



DETAIL 1



FRAME DETAILS



PLAN

NOTES

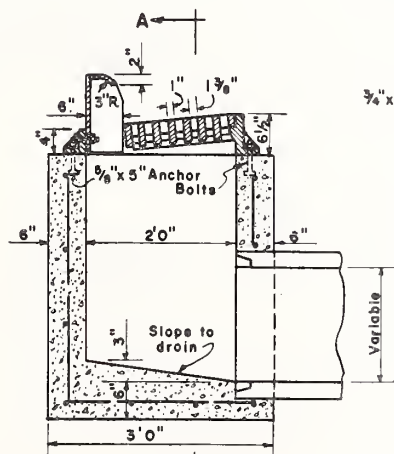
For curb heights greater than 8 inches curb box may be modified.

Curb and gutter to be warped to match drop inlet.

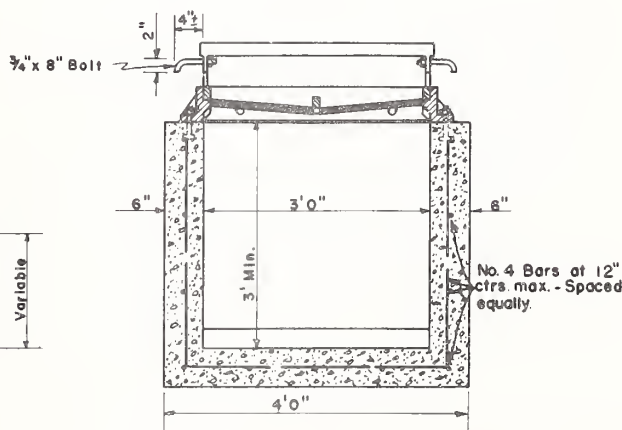
All concrete to be class "DD" OR EQUAL.

These details to serve as an example only. Designers will design to fit specific conditions. See plans for details and quantities. Use local standards where available.

After placement of curb box, the adjustment slats may be filled to supply bearing to bolts so to carry wheel loads, or bolt holes may be drilled in curb box after grades are established.



SECTION B-B



SECTION A-A

STANDARD DRAWING

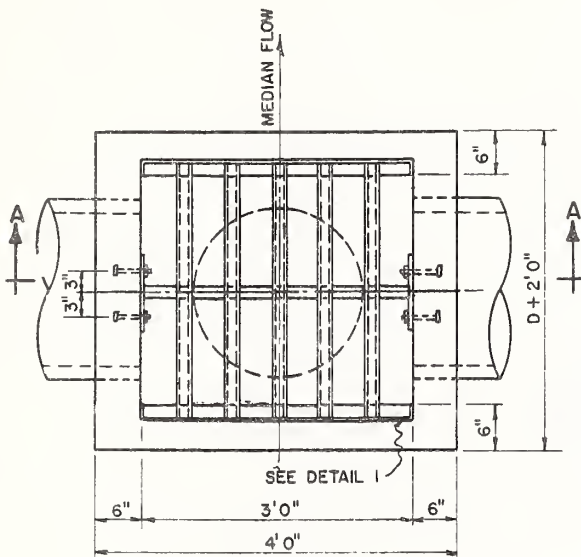
REFERENCE : DWG. NO.
STANDARD SPEC. 54
SECTION 77

CURB INLET BOX AND COVER

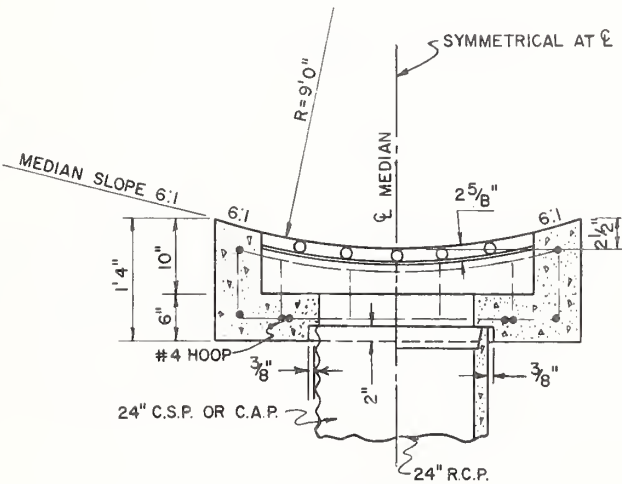
APPROVED: H. J. ANDERSON - DIRECTOR OF HIGHWAYS
BY: *[Signature]*
ADMINISTRATOR - ENGINEERING DIVISION

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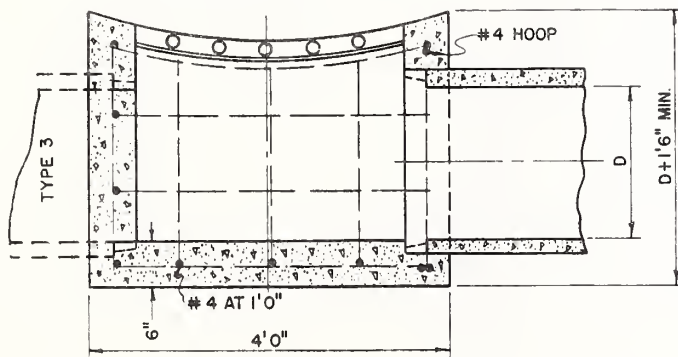
NOTE: WHEN MEDIAN INLET COVER IS INSTALLED OVER PIPES LARGER THAN 36", WITHOUT ADEQUATE COVER TO PERMIT THE USE OF TYPE I INSTALLATION, A DETAIL DRAWING OF THE INSTALLATION SHALL BE PROVIDED IN THE PLANS.



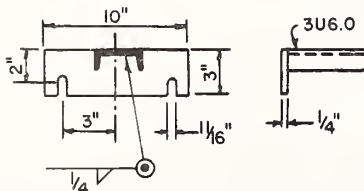
PLAN VIEW
TYPICAL FOR TYPES 1, 2, & 3



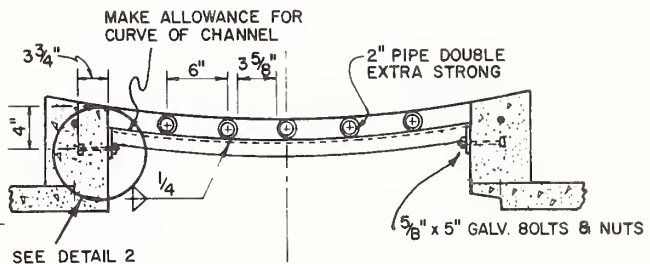
SECTION A-A
TYPE I



SECTION A-A
TYPE 2 & 3 - R.C.P., C.S.P. OR C.A.P.
TYPE 2 HAS 1 PIPE CONNECTION
TYPE 3 HAS 2 PIPE CONNECTION



DETAIL 2



DETAIL 1

NOTES: ALL EXPOSED METAL PARTS TO BE PAINTED WITH ONE COAT OF RED LEAD AND TWO COATS OF ALUMINUM PAINT.

UNIT PRICE BID FOR MEDIAN INLET COVER SHALL INCLUDE PAYMENT FOR THE CONCRETE, REINFORCING STEEL, GRATE, AND ADDITIONAL EXCAVATION, COMPLETE IN PLACE.

* GRATE AND REINF. STEEL			
	24"	30"	36"
TYPE 1	50 LBS.	—	—
TYPE 2	85 LBS.	95 LBS.	105 LBS.
TYPE 3	*85 LBS.	*95 LBS.	*105 LBS.
GRATE	165 LBS.	185 LBS.	210 LBS.

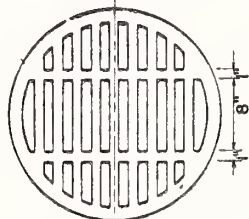
* CL. "DD" CONC. OR EQUAL			
TYPE	24"	30"	36"
1	.5 CU. YDS.	—	—
2	.9 CU. YDS.	1.1 CU. YDS.	1.3 CU. YDS.
3	*.9 CU. YDS.	*1.0 CU. YDS.	*1.1 CU. YDS.

* QUANTITIES ARE FOR ESTIMATING PURPOSES ONLY TYPE 3 WILL BE A SPECIAL CASE TO BE FIGURED FOR THE PARTICULAR INSTALLATION.

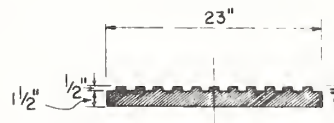
REVISED
EFFECTIVE 3/1/72

STANDARD DRAWING	
REFERENCE: STANDARD SPEC. SECTION 77	DWG. NO. 55
MEDIAN INLET COVER	
APPROVED: H. J. ANDERSON - DIRECTOR OF HIGHWAYS BY: <i>Jack R. Baker</i> ADMINISTRATOR - ENGINEERING DIVISION	

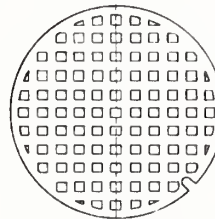
DETAIL
CATCH BASIN COVER



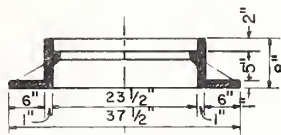
CATCH BASIN COVER



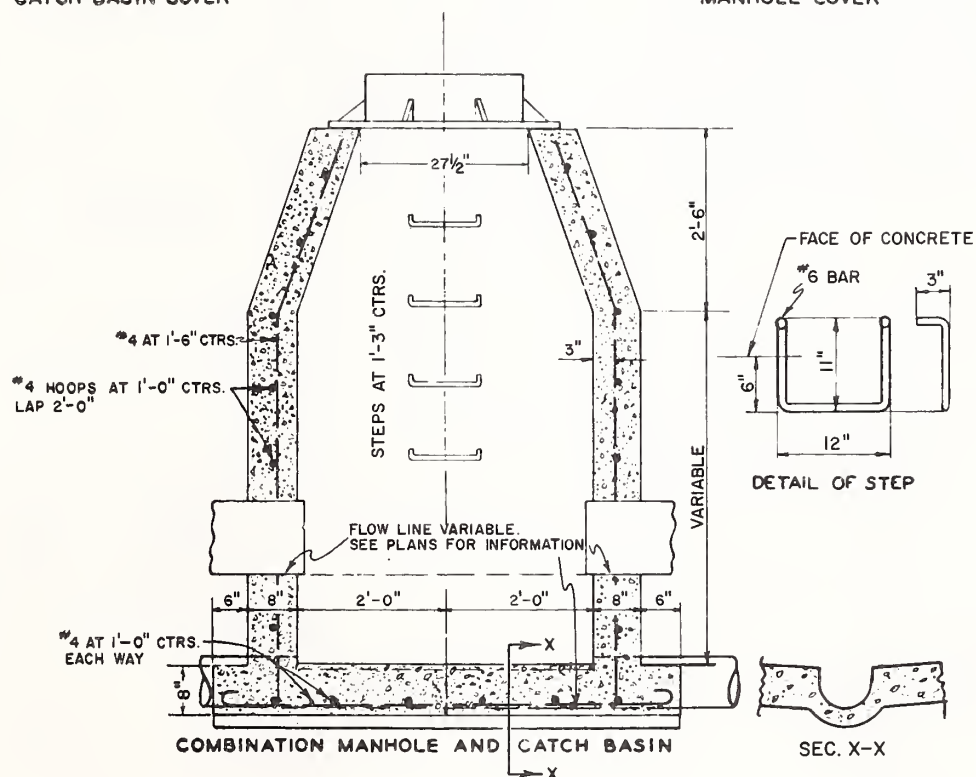
DETAIL
MANHOLE COVER



MANHOLE COVER



DETAIL CASTING

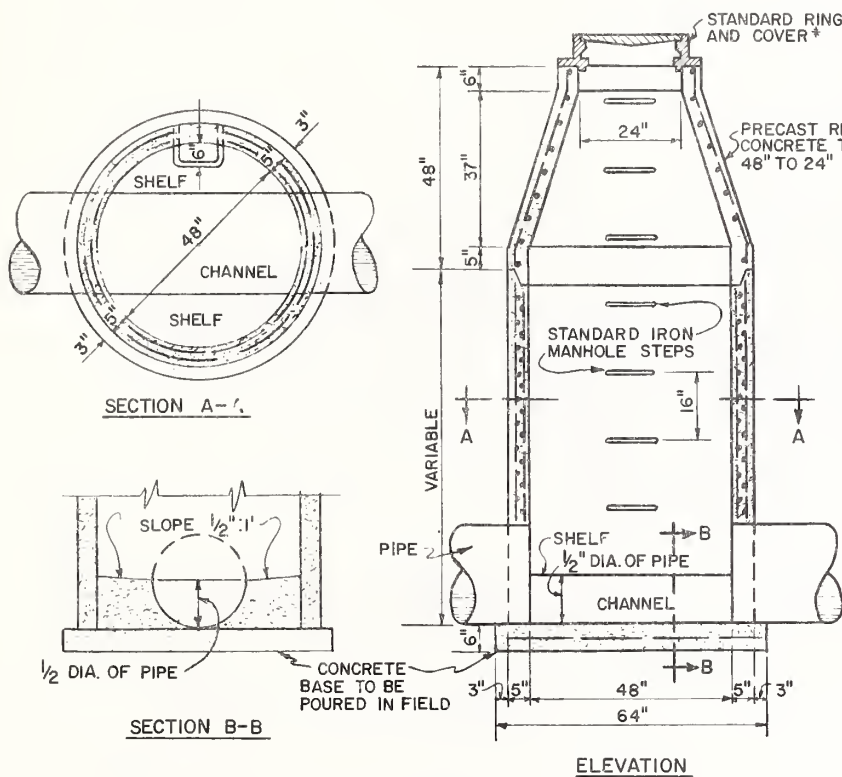


WALLS OF MANHOLE OR CATCHBASIN MAY BE EITHER CONCRETE OR CEMENT BLOCKS.
THE DETAILS SHOWN HERE ARE TO SERVE AS AN EXAMPLE.
DESIGNERS WILL DESIGN TO SPECIFIC CONDITIONS.
USE LOCAL STANDARDS WHERE AVAILABLE.
ALL CONCRETE TO BE CLASS "DD" OR EQUAL.
THE COVER AND RING SHALL BE TOOLED TO A MACHINE FIT.
THIS STRUCTURE IS INTENDED TO BE CAST IN PLACE.

REVISED	
EFFECTIVE	3/1/72

STANDARD DRAWING	
REFERENCE: STANDARD SPEC. SECTION 77	DWG. NO. 56
COMBINATION MANHOLE AND CATCH BASIN	
APPROVED: H. J. ANDERSON - DIRECTOR OF HIGHWAYS BY: <u>[Signature]</u> ADMINISTRATOR - ENGINEERING DIVISION	

ANY OTHER TYPE OF MANHOLE REQUIRED WILL BE DESIGNED AND DESIGNATED AS "SPECIAL MANHOLE".



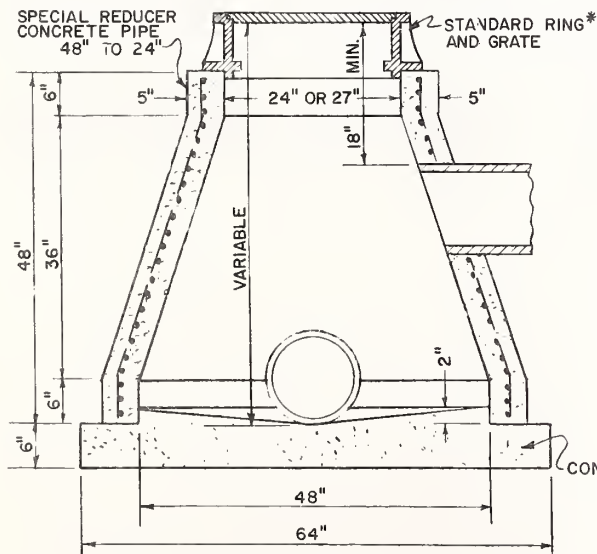
* MINIMUM WEIGHT FOR RING AND COVER IS 400 LBS.
RING AND COVER SHALL BE TOOLED TO A MACHINE FIT.

UPPER PART TO BE SPECIAL SECTION TO REDUCE DIAMETER FROM 48" TO 24".
BOTTOM OF LOWER SECTION TO BE CUT SQUARE TO FIT BASE. GROUT JOINT BETWEEN BASE AND WALL. A GROUT CONSISTING OF ONE PART PORTLAND CEMENT AND TWO PARTS APPROVED SAND MAY BE USED, AN APPROVED PRE-MIXED GROUT, AVAILABLE COMMERCIALY, MAY BE USED.

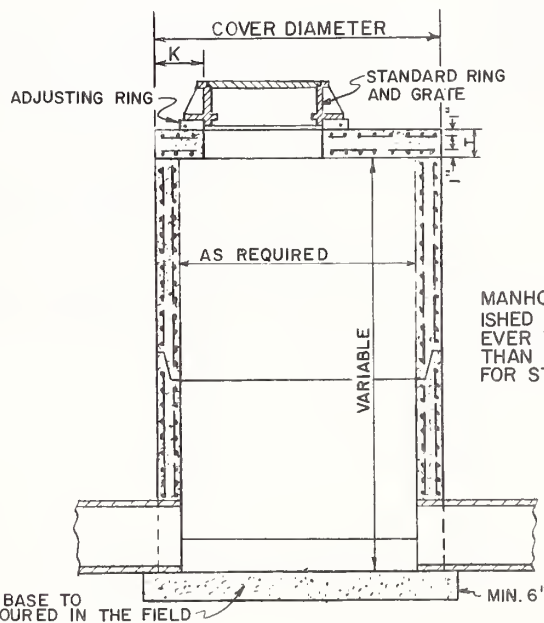
ALL MANHOLE CONSTRUCTION, EXCEPTING RING, COVER, AND BASE, SHALL CONFORM TO A.S.T.M. C 478. THIS PROVIDES THAT REINFORCEMENT MAY BE MADE OF (1) COLD DRAWN STEEL WIRE - A.S.T.M. A 82, (2) STEEL WIRE FABRIC - A.S.T.M. A 185, OR (3) STEEL BARS - A.S.T.M. A 15. THE CONSTRUCTION AND REINFORCEMENT OF THE BASE FOR EACH TYPE SHALL BE COMPATIBLE WITH THE CONDITIONS AND THE WEIGHT OF THE SUPERSTRUCTURE. A.S.T.M. C 478 PROVIDES FOR 4000 PSI CONCRETE. THE MIX CALLS FOR 6 SACKS OF CEMENT / CU. YD. REINFORCEMENT SHOWN IS ILLUSTRATIVE ONLY. SEE A.S.T.M. C 478.

THE ECCENTRIC CONE PRECAST TOP WILL BE PERMITTED WHEN ITS USE WILL BE AS GOOD OR BETTER THAN THE ONES SHOWN, OR IF IT IS MORE ADAPTABLE TO EXISTING CONDITIONS.

TYPE 1 MANHOLE



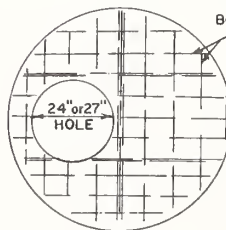
TYPE 2 MANHOLE



MANHOLE WILL BE FURNISHED WITH STEPS WHENEVER THE DEPTH IS MORE THAN 4 FEET. SEE TYPE 1 FOR STANDARD.

TYPE 3 MANHOLE

TYPE 3 M.H. COVER				
PIPE DIA.	COVER DIA.	CLASS '00 CONC. CU.YD.	T	K
48"	58"		6"	6"
54"	65"		8"	6"
60"	72"		8"	7"
66"	79"		8"	7"
72"	86"		8"	8"

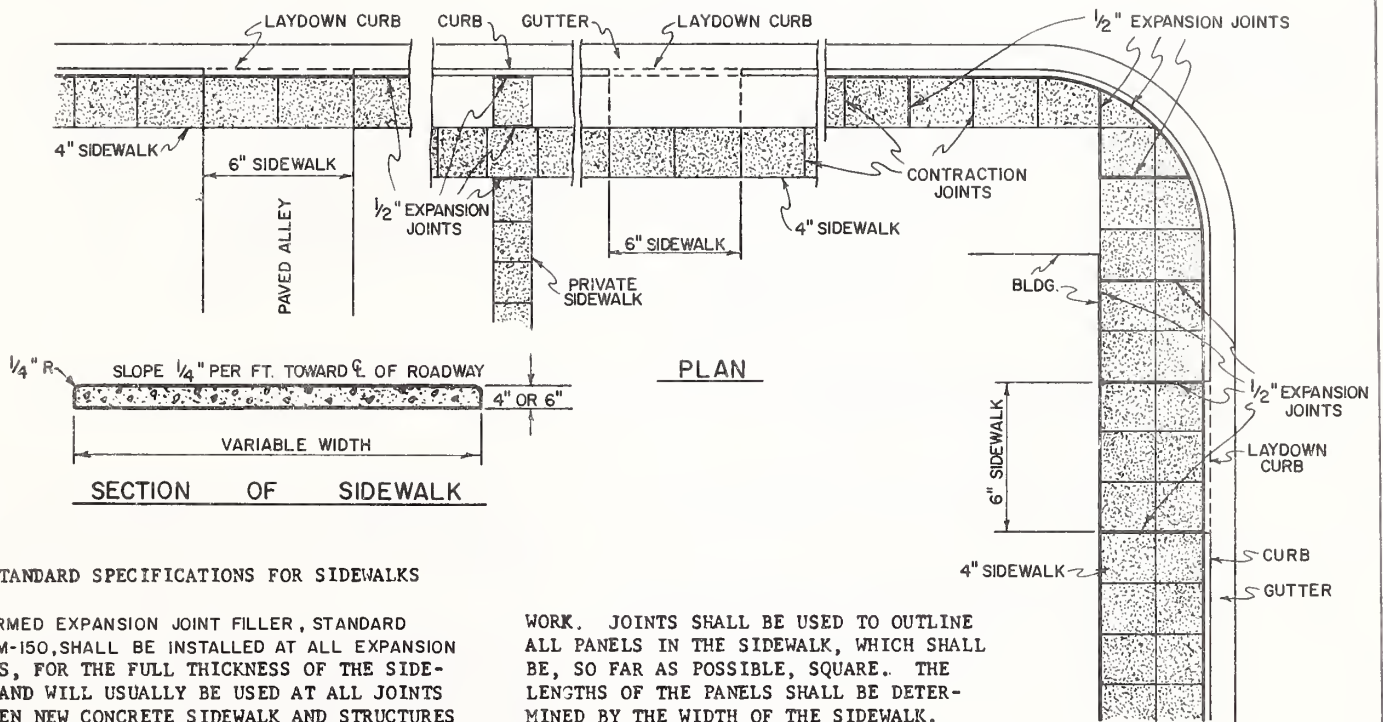


TYPE 3 MANHOLE COVER

BOTTOM BARS - 4 AT 6" CENTERS
TOP BARS - 3 AT 6" CENTERS - (FOR 54" & LARGER ONLY)

STANDARD DRAWING	
REFERENCE:	DWG. NO.
STANDARD SPEC.	57
SECTION 77	
PRECAST CONCRETE MANHOLE	
APPROVED: H. J. ANDERSON - DIRECTOR OF HIGHWAYS	
BY: [Signature]	
ADMINISTRATOR - ENGINEERING DIVISION	

REVISED	12/1/72
EFFECTIVE	3/1/72
	1/1/73



SEE STANDARD SPECIFICATIONS FOR SIDEWALKS

PREFORMED EXPANSION JOINT FILLER, STANDARD SPEC. M-150, SHALL BE INSTALLED AT ALL EXPANSION JOINTS, FOR THE FULL THICKNESS OF THE SIDEWALK AND WILL USUALLY BE USED AT ALL JOINTS BETWEEN NEW CONCRETE SIDEWALK AND STRUCTURES IN PLACE. PREFORMED EXPANSION JOINT FILLER SHALL BE INCLUDED IN THE UNIT PRICE BID PER SQUARE YARD FOR CONCRETE SIDEWALK.

ALL JOINTS SHALL BE STRAIGHT AND PERPENDICULAR TO THE CENTERLINE AND THE SURFACE OF THE SIDEWALK. ALL JOINTS, WHERE PRACTICABLE, SHALL ALIGN WITH LIKE JOINTS IN ADJOINING

WORK. JOINTS SHALL BE USED TO OUTLINE ALL PANELS IN THE SIDEWALK, WHICH SHALL BE, SO FAR AS POSSIBLE, SQUARE. THE LENGTHS OF THE PANELS SHALL BE DETERMINED BY THE WIDTH OF THE SIDEWALK.

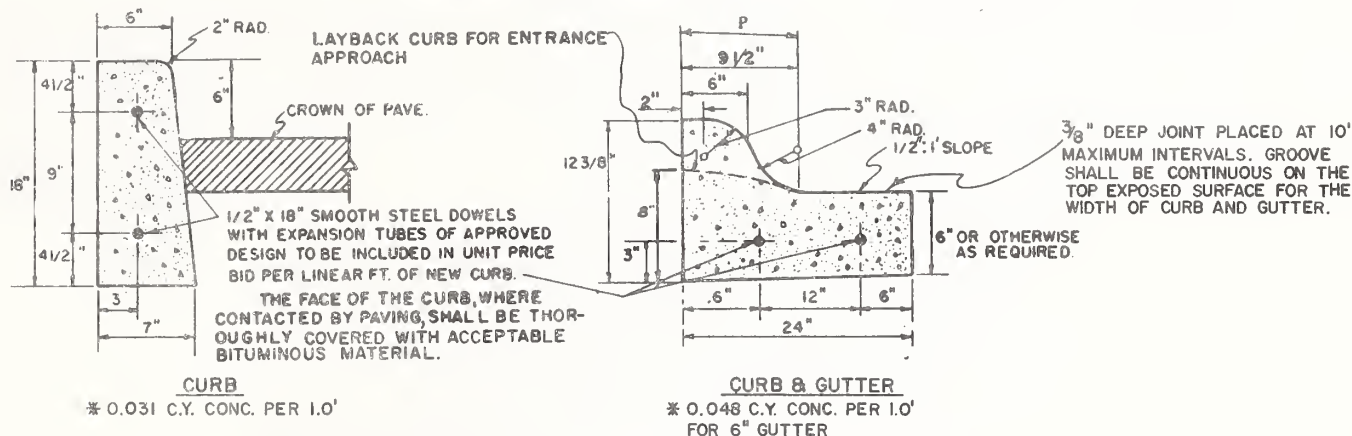
CONTRACTION JOINTS SHALL BE NOT MORE THAN 1/8 INCH WIDE AND NOT LESS THAN 1 INCH IN DEPTH AND MAY BE CUT BY A GROOVE FORMING TOOL.

EXPANSION JOINTS AT THE NEAREST MULTIPLE OF THE CONTRACTION JOINT INTERVAL BUT NOT TO EXCEED 60 FEET.

STANDARD DRAWING	
REFERENCE:	DWG. NO.
STANDARD SPEC.	65
SECTION 76	
CONCRETE SIDEWALK	
APPROVED: H. J. ANDERSON, DIRECTOR OF HIGHWAYS	
BY: <i>Chas. R. Beck</i>	
ADMINISTRATOR—ENGINEERING DIVISION	

REVISED			
EFFECTIVE	3/1/72		

CONCRETE CURBS



P- WHEN PAINTED CURB IS REQUIRED, THIS IS THE AREA TO BE COVERED. PAINTING INCLUDED IN COST OF CURB.

JOINTS:

(A) WHEN DEFINITELY TIED TO PAVEMENT SLAB, SEPARATE CURB OR INTEGRAL CURB AND GUTTER SHALL HAVE THE EXPANSION JOINT OF THE PAVEMENT SLAB EXTENDED THROUGH AND SHALL BE COMPLETELY FILLED WITH A MINIMUM OF 1/2" WIDTH OF PREFORMED EXPANSION JOINT FILLER WITH DOWEL BARS FITTED WITH EXPANSION TUBES AT EACH JOINT.

(B) WHEN NOT DEFINITELY TIED TO PAVEMENT SLAB, SEPARATE CURB OR INTEGRAL CURB AND GUTTER SHALL HAVE THROUGH JOINTS AT PREDETERMINED INTERVALS FILLED WITH A MINIMUM OF 1/2" WIDTH OF PREFORMED EXPANSION JOINT FILLER AND WITH DOWEL BARS FITTED WITH EXPANSION TUBES. SUCH JOINT INTERVALS SHALL BE DETERMINED BY PRORATING THE DISTANCE BETWEEN CURB RETURNS WITH SUCH INTERVALS TO BE NOT LESS THAN 30 FEET NOR GREATER THAN 50 FEET. DOWEL BARS WITH EXPANSION TUBES AND A MINIMUM OF 1/2" WIDTH OF PREFORMED EXPANSION JOINT FILLER SHALL BE PLACED AT THE TERMINI OF ALL CURB RETURNS EXCEPT THAT ONLY DOWEL EXPANSION TUBES SHALL BE PLACED IN THE END OF THE CURB RETURN WHEN THE CURB RETURN IS NOT ABUTTING OLD CURB.

(C) A MINIMUM 1/2" WIDTH OF PREFORMED EXPANSION JOINT FILLER SHALL BE PLACED BETWEEN THE CURB OR GUTTER AND ANY CONCRETE PAVEMENT SLAB.

(D) A MINIMUM 1/2" WIDTH OF PREFORMED EXPANSION JOINT FILLER SHALL BE PLACED BETWEEN THE CURB AND SIDEWALK OR ANY SOLID STRUCTURE.

(E) PREFORMED EXPANSION JOINT FILLER SHALL COMPLY WITH THE REQUIREMENTS OF STANDARD SPEC. M-150.

RADII:

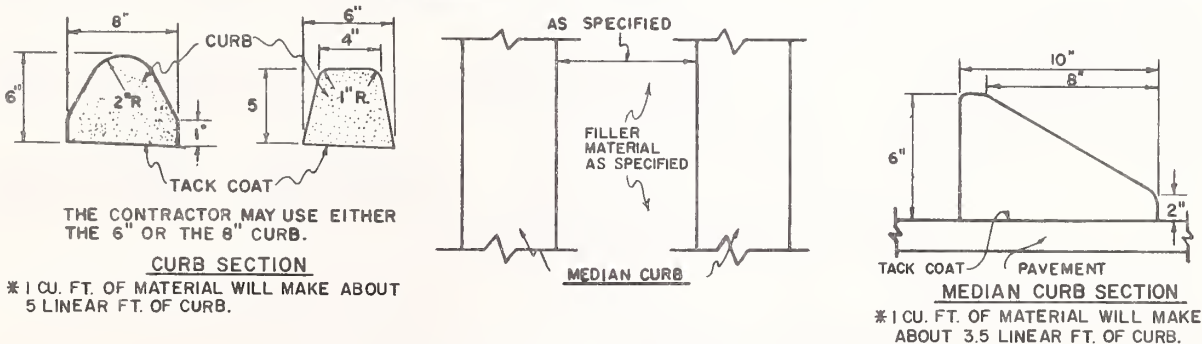
MINIMUM CURB RETURN RADII - 10'

15' RADII DESIRABLE FOR STREETS

CONCRETE:

UNLESS OTHERWISE SPECIFIED, CONCRETE CURBS AND CONCRETE INTEGRAL CURB AND GUTTER SHALL BE CONSTRUCTED OF AIR-ENTRAINED CLASS "DD" CONCRETE OR EQUAL.

BITUMINOUS CURBS



ALL MATERIALS AND CONSTRUCTION TO CONFORM TO STANDARD SPECIFICATIONS FOR BITUMINOUS CURB.

* QUANTITIES FOR ESTIMATING PURPOSES ONLY.

STANDARD DRAWING

REFERENCE : DWG. NO.
STANDARD SPEC. 66
SECTION 75

STANDARD CURBS

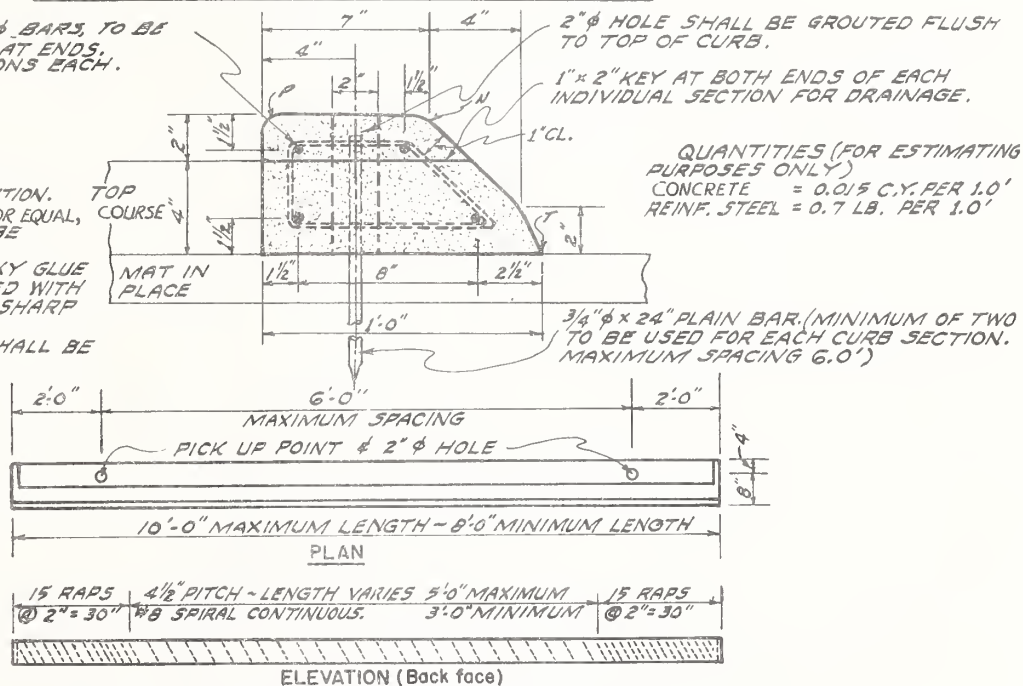
APPROVED: H. J. ANDERSON - DIRECTOR OF HIGHWAYS
BY: *John R. Smith*
ADMINISTRATOR - ENGINEERING DIVISION

REVISED
EFFECTIVE 3/1/72

PRECAST-PRESTRESSED CONCRETE CURB (TYPE "A")

REINFORCE WITH 4- $\frac{1}{4}$ " ϕ BARS, TO BE CUT $\frac{1}{2}$ " BACK FROM FACE AT ENDS. JACKING LOAD = 3.1 TONS EACH.

NOTES:- CURBS TO BE CAST IN INVERTED POSITION. CLASS "DD" CONCRETE OR EQUAL, TYPE III CEMENT TO BE USED THROUGHOUT. PATCH HOLE WITH EPOXY GLUE TRETOL NO. T365 MIXED WITH FOUR VOLUMES CLEAN SHARP SAND. ALL EXPOSED EDGES SHALL BE ROUNDED $\frac{3}{4}$ " RADIUS. CONCRETE ~ 4000 PSI @ TRANSFER.

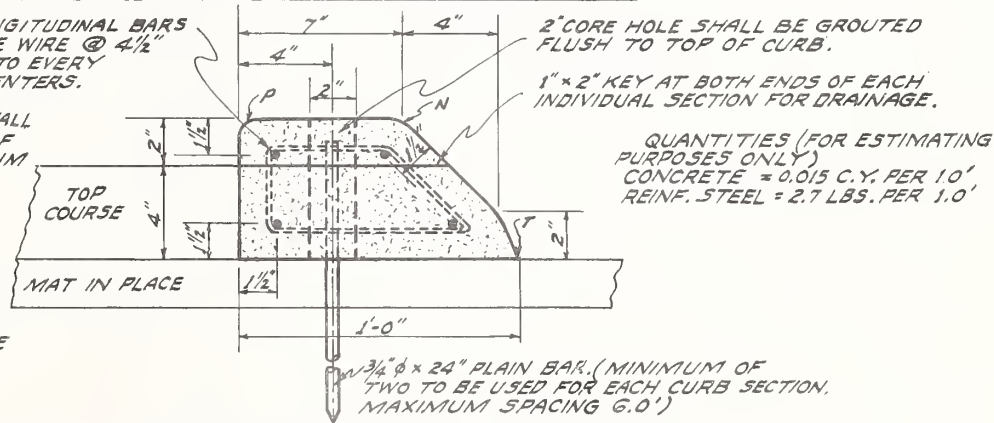


PRECAST CONCRETE CURB (TYPE "A" - Mat in place)

REINFORCE WITH 4- $\frac{1}{4}$ " LONGITUDINAL BARS AND WRAP WITH 8-GAGE WIRE @ 4 1/2" PITCH. TIE 8-GAGE WIRE TO EVERY REINFORCING BAR @ 2' CENTERS.

NOTES: CURBS SHALL BE PRECAST A MINIMUM OF 4' LENGTHS AND A MAXIMUM OF 10' LENGTHS. ALL EXPOSED EDGES SHALL BE ROUNDED $\frac{3}{4}$ " RADIUS.

TYPES "A" & "B" CONCRETE SHALL BE CLASS "DD" OR CONCRETE OF EQUAL STRENGTH.



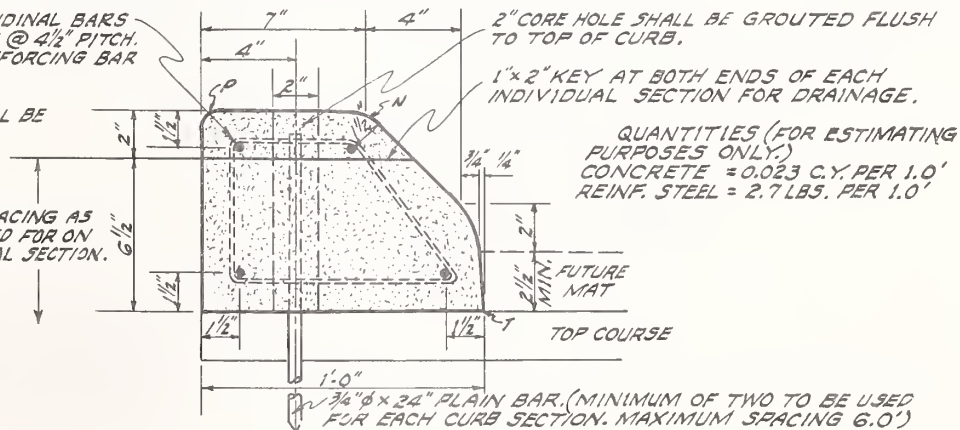
PRECAST CONCRETE CURB (TYPE "B" - Future mat)

REINFORCE WITH 4- $\frac{1}{4}$ " LONGITUDINAL BARS AND WRAP WITH 8-GAGE WIRE @ 4 1/2" PITCH. TIE 8-GAGE WIRE TO EVERY REINFORCING BAR @ 2' CENTERS.

NOTES: CURBS SHALL BE PRECAST A MINIMUM OF 4' LENGTHS AND A MAXIMUM OF 10' LENGTHS.

ALL EXPOSED EDGES SHALL BE ROUNDED $\frac{3}{4}$ " RADIUS.

SURFACING AS CALLED FOR ON TYPICAL SECTION.



STANDARD DRAWING

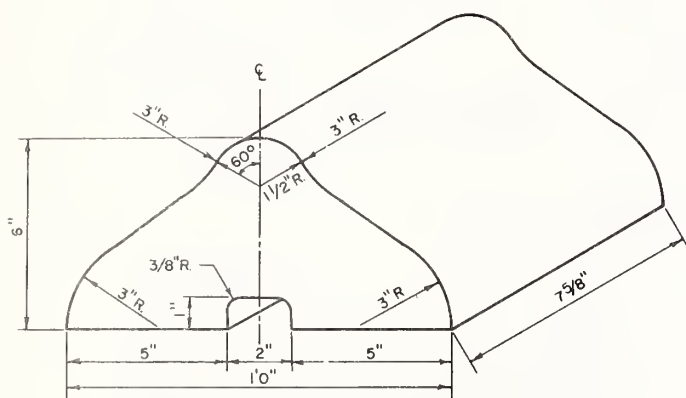
REFERENCE: DWG. NO. 67
STANDARD SPEC.
SECTION 75

PRECAST CONCRETE CURBS

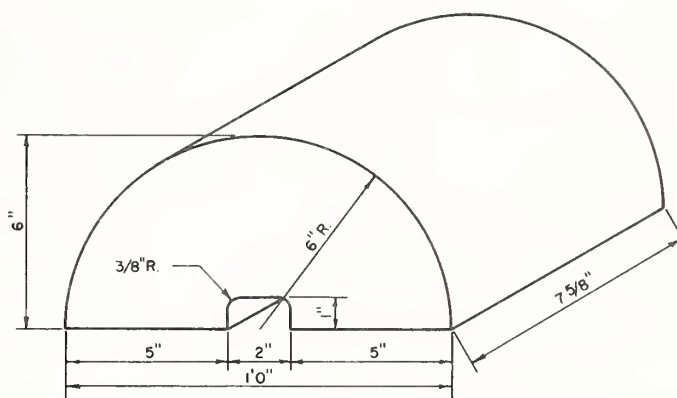
APPROVED: H. J. ANDERSON - DIRECTOR OF HIGHWAYS
BY: *Jack P. Rishel*
ADMINISTRATOR - ENGINEERING DIVISION

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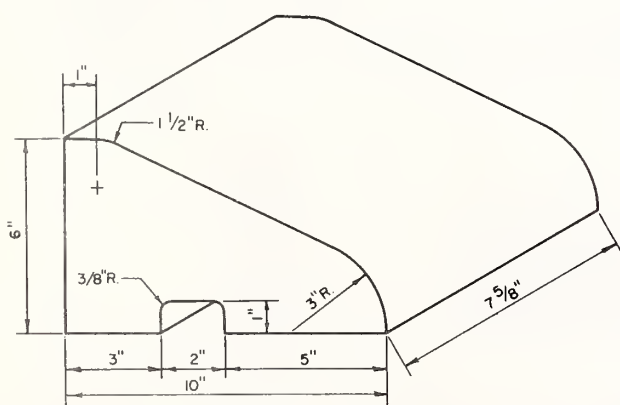
3/1/72



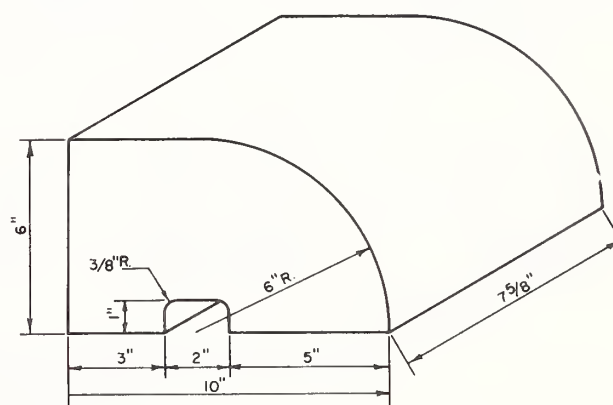
TYPE I BLOCK



TYPE I REFLECTOR BLOCK



TYPE II BLOCK



TYPE II REFLECTOR BLOCK

NOTES:

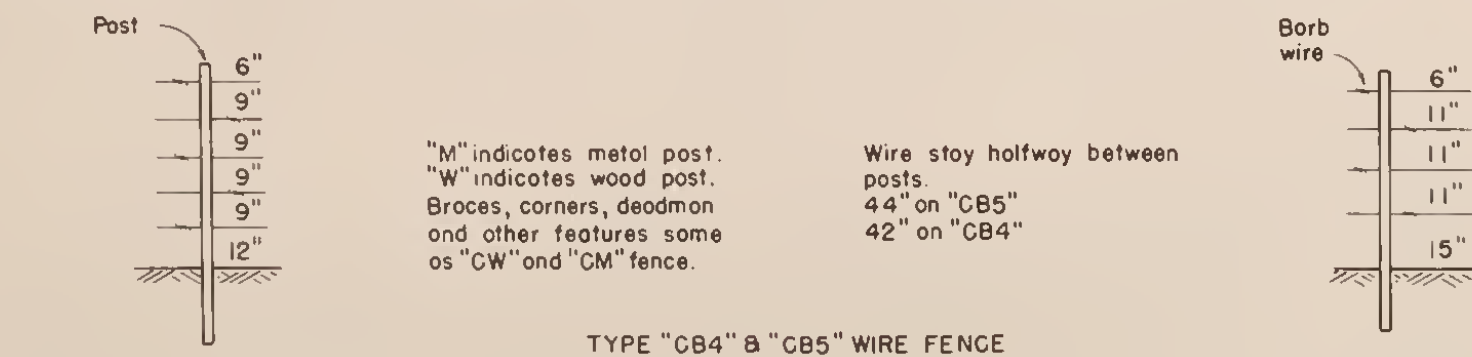
Every sixth block shall be a reflector block, unless otherwise specified.

Concrete shall be Class "DD" or concrete of equal strength.

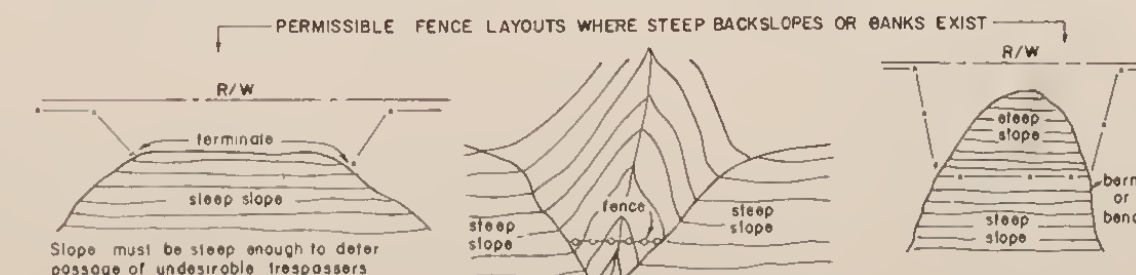
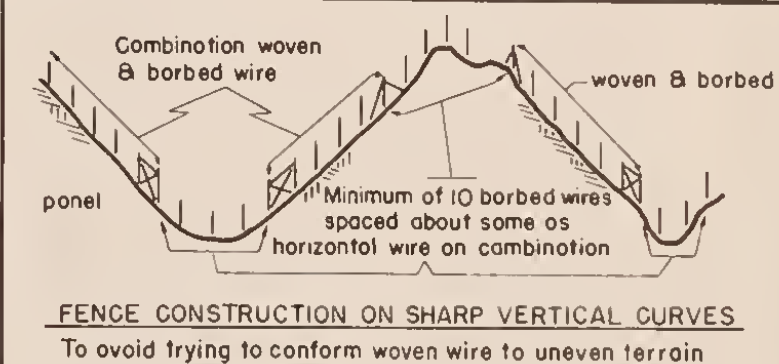
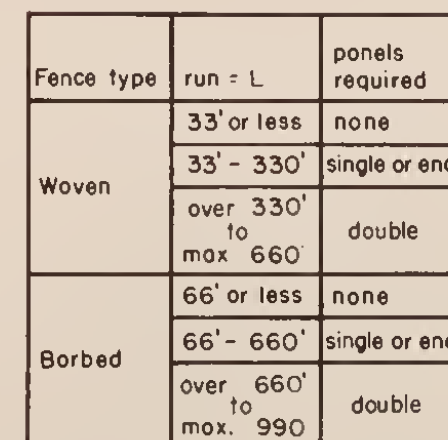
Blocks shall be set with approved Portland cement grout or with an approved adhesive agent.

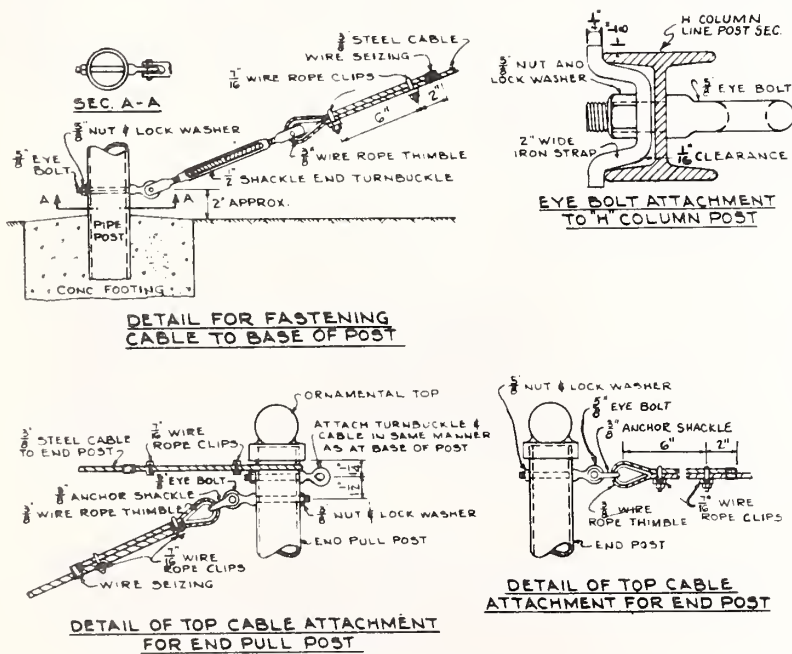
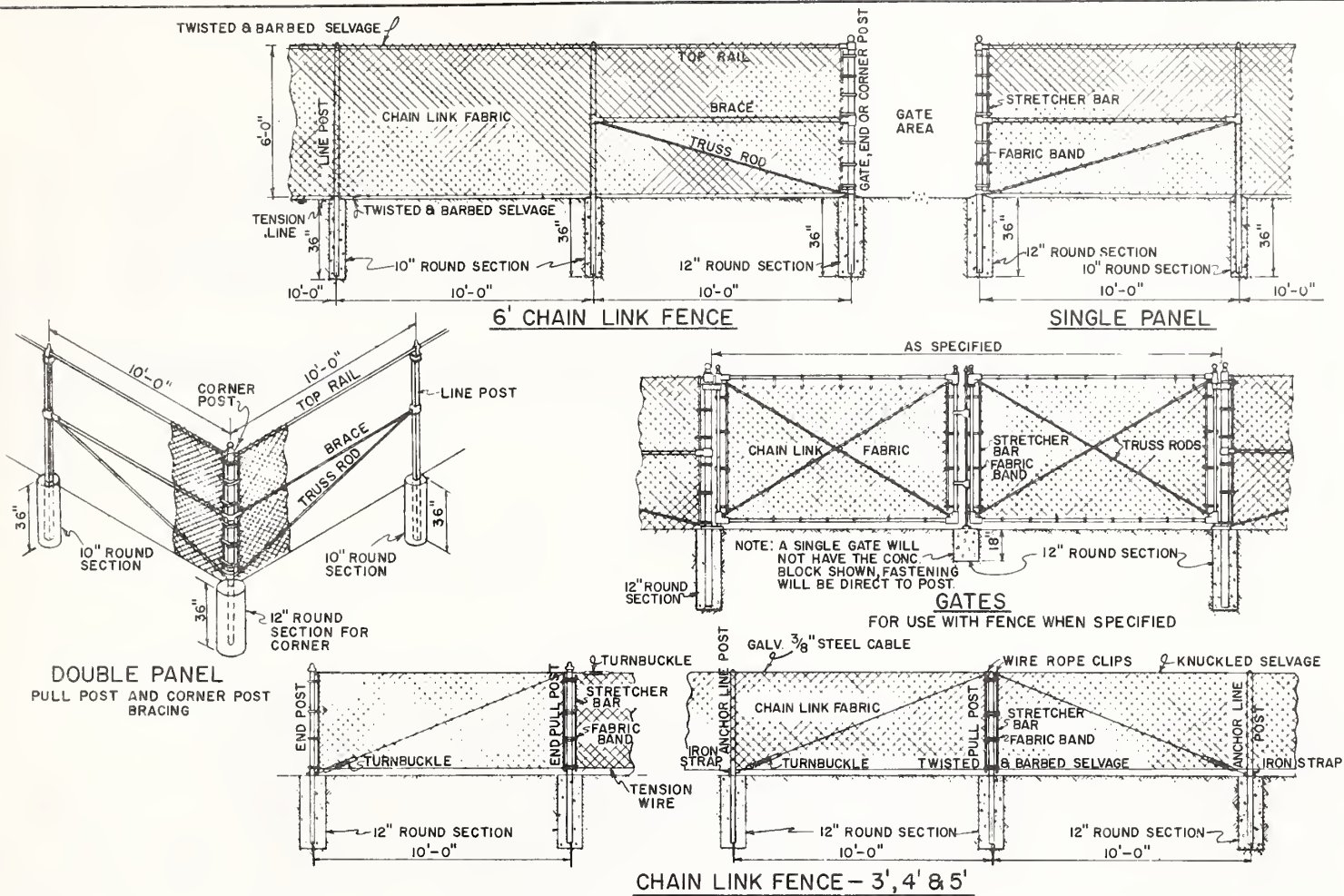
STANDARD DRAWING	
REFERENCE:	DWG. NO.
STANDARD SPEC.	68
SECTION 75	
PRECAST TRAFFIC CURBS	
APPROVED: H. J. ANDERSON - DIRECTOR OF HIGHWAYS	
BY: <i>[Signature]</i>	
ADMINISTRATOR-ENGINEERING DIVISION	

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Staple all wires of woven wire to wood corner posts or post used to tie-off wire.





CABLE ATTACHMENT DETAILS
FOR USE WITH 3', 4' & 5' FENCE

A SINGLE PANEL SHALL BE PLACED AT EVERY END OF CHAIN LINK FENCE. SEE SPECIFICATIONS FOR MATERIALS.

SEE STANDARD SPECIFICATIONS FOR FURTHER REQUIREMENTS.

GATES ARE INCLUDED ON THIS STANDARD FOR USE IN SPECIAL CASES ONLY. THEY SHALL NOT BE INSTALLED AT ANY LOCATION UNLESS SPECIFIED BY THE ENGINEER.

LINE POSTS ON 3 FOOT AND 4 FOOT FENCE, OTHER THAN THE TWO POSTS ADJACENT TO PULL POSTS, NEED NOT BE SET IN CONCRETE BUT MAY BE DRIVEN OR DRILLED INTO SOLID EARTH.

PULL POST BRACING ON 6 FOOT FENCE SHALL BE SAME AS CORNER BRACING SHOWN IN DETAIL UPPER LEFT.

ALL CONCRETE IS CLASS "F" OR BETTER.

THE ESSENTIAL FEATURES SHOWN HEREON ARE APPLICABLE TO ALUMINUM ALLOY FENCE. ALUMINUM ALLOY FENCE WILL NOT USE CABLE AT TOP BUT WILL REQUIRE TOP RAIL FOR ALL HEIGHTS.

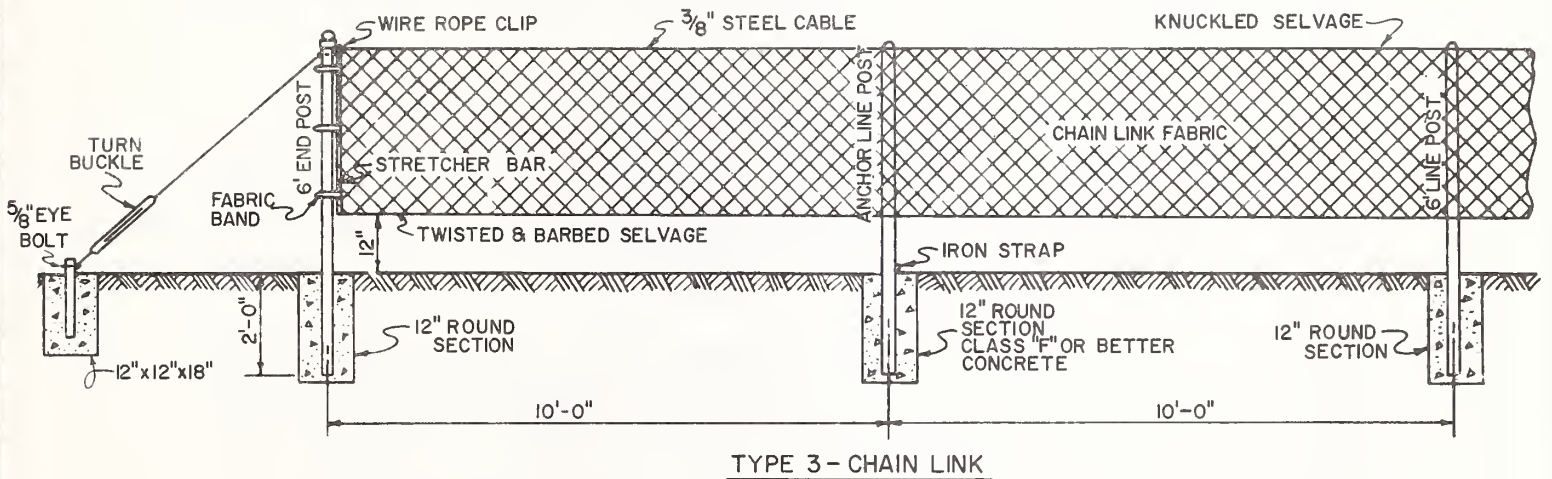
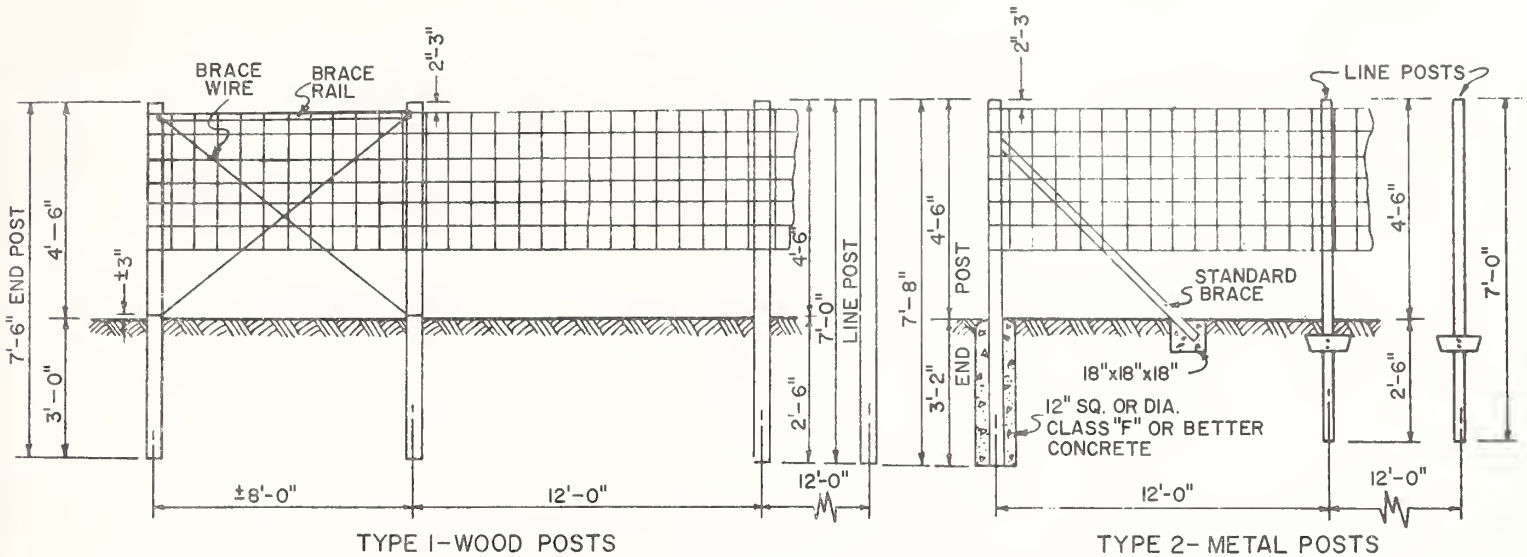
DOUBLE PANELS SHALL BE INSTALLED NO MORE THAN 300 FEET APART ON TANGENT AND USED FOR PULLING. SUCH PANELS SHALL BE PLACED AT EACH END OF EACH CURVE SHARPER THAN 5° AND BE APPROXIMATELY EVENLY SPACED BETWEEN, ABOUT 20° OF CENTRAL ANGLE (10° DEFLECTION) APART, BUT NOT MORE THAN 250 FEET APART ON ANY CURVE. SEE SPECIFICATIONS FOR MATERIALS.

HEIGHT OF FABRIC	WIRE FABRIC ABOVE GROUND	DEPTH OF CONCRETE	POST IN CONC. (MIN.)
6'	1"-2"	36"	32"
5'	1"-2"	36"	32"
4'	1"-2"	30"	26"
3'	1"-2"	30"	26"

REVISED
EFFECTIVE 3/1/72

STANDARD DRAWING	
REFERENCE: STANDARD SPEC. SECTION 80	DWG. NO. 76
CHAIN LINK FENCE	
APPROVED: H. J. ANDERSON - DIRECTOR OF HIGHWAYS BY: <i>[Signature]</i> ADMINISTRATOR - ENGINEERING DIVISION	

WOVEN WIRE



WOVEN WIRE MEDIAN BARRIER FENCE

WOVEN WIRE - PART (B) - ARTICLE M-210.02
 BRACE WIRE - PART (D) - ARTICLE M-210.02
 WOOD POSTS - PART (I) - ARTICLE M-210.02
 METAL POSTS - PART (H) - ARTICLE M-210.02
 DEADMAN --- PART (K) - ARTICLE M-210.02
 CONCRETE MATERIALS TO CONFORM TO STD. SPEC.
 CONSTRUCTION IN ACCORDANCE WITH STD. SPEC.

CHAIN LINK MEDIAN BARRIER FENCE

WHEN CHAIN LINK MEDIAN BARRIER FENCE IS SPECIFIED:
 REFER TO STANDARD SPECIFICATIONS, FOR
 MATERIALS AND CONSTRUCTION
 CHAIN LINK FABRIC TO BE GALVANIZED STEEL
 TOP RAIL OR CABLE SHALL NOT BE USED.
 TOP AND BOTTOM OF WIRE MESH SHALL BE KNUCKLED SELVAGE.

METAL POST SPACING SAME AS WOOD.
 SET END POST IN CONCRETE
 METAL LINE POSTS TO HAVE STANDARD ANCHOR PLATE
 END POSTS TO BE ANGLE STEEL $2\frac{1}{2}'' \times 2\frac{1}{2}'' \times \frac{1}{4}''$

GENERAL NOTES

MAXIMUM SPACING BETWEEN PANELS AND/OR PULL POSTS
 SHALL BE APPROXIMATELY 400 FEET ON TYPES 1, 2
 AND 3 MEDIAN BARRIER FENCE (LESS IF DIRECTED BY
 ENGINEER OR SO SPECIFIED).

STANDARD DRAWING

REFERENCE:
 STANDARD SPEC.
 SECTION 80

DWG. NO.
 77

MEDIAN BARRIER FENCE

APPROVED: H. J. ANDERSON, DIRECTOR OF HIGHWAYS
 BY: *John D. Baker*
 ADMINISTRATOR - ENGINEERING DIVISION

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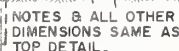
3/1/72

DIR. OF PULL



6 WIRE FENCE (TYPE F-6)

FOR PANEL DETAILS SEE
STD. DWG. 75

NUMBER OF BARBED
WIRE AS SPECIFIED.


Technical drawing of a gate assembly, showing side and end views with dimensions and notes.

Dimensions:

- Overall width: 16'-0"
- Overall height: 8'-0"
- Gate height: 7'-6"
- Gate width: 8'-3"
- Gate thickness: 1 1/2"
- Gate material: 1 1/2" x 16" WROUGHT STEEL STRAP HINGES
- Gate material: 3-3/8" x 3 1/2" GALVANIZED CARRIAGE BOLTS
- Gate material: 3/4" x 10" BOLT HOOKS
- Gate material: 6" HOOKS WITH STAPLES
- Gate material: 1 1/2" x 16" WROUGHT STEEL STRAP HINGES
- Gate material: 3-3/8" x 3 1/2" GALVANIZED CARRIAGE BOLTS
- Gate material: 3/4" x 10" BOLT HOOKS
- Gate material: 6" HOOKS WITH STAPLES

Notes:

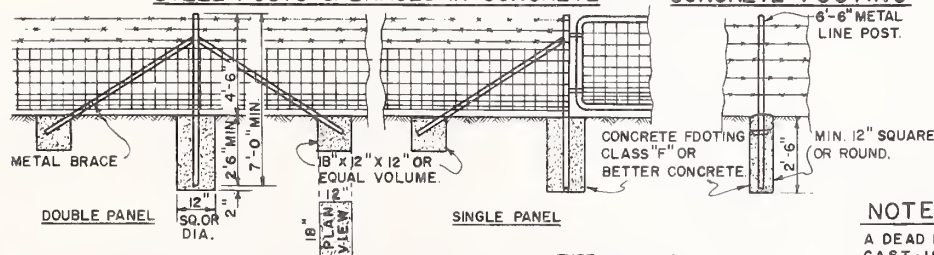
- NOTES & ALL OTHER DIMENSIONS SAME AS TOP DETAIL.
- 1 1/2" x 16" WROUGHT STEEL STRAP HINGES BOLTED TO GATE WITH 3-3/8" x 3 1/2" GALVANIZED CARRIAGE BOLTS.
- NAILS 10d & CLINCHED FOR GATE CONSTRUCTION.

46" NO. 2 ELECTRICALLY WELDED TWIST
LINK CHAIN SECURELY STAPLED TO POST
8 2" Ø X 42" LEVER, 14"-11 GA. WIRE LEVER
RETAINER FASTENED TO TOP WIRE. 

[illegible]

NOTES & ALL OTHER
DIMENSIONS SAME AS
TOP DETAIL

METAL POST
CONCRETE FOOTING



6'-6" LONG, 1.33 LBS. PER FT,
NOMINAL FACTORY PAINTED OR
GALVANIZED.

B'-0" LONG (NOMINAL)

SHALL BE AT THE END OF ANY RUN OF
WIRE OR AT ANY STRETCH PANEL.

TYPE G-3 GATE
IS METAL.
A GOOD SUBSTANTIAL
GATE, COMMERCIALY
AVAILABLE AND IN
GENERAL USE.

A DEAD MAN MAY BE A CONCRETE BLOCK, A CAST-IN-PLACE CONCRETE BLOCK, A ROCK OR OTHER APPROVED OBJECT, WEIGHING AT LEAST 150 LBS. AND COVERED AT LEAST 2 FEET

EACH CORNER, END GATE, OR PULL POST
AND EACH BRACE SHALL BE SET IN CONCRETE
AND BRACED AS INDICATED.

USE A 16' GATE UNLESS R/W AGREEMENT STATES OTHERWISE.

ON TYPE G-2 FARM GATE, MATERIAL SHALL BE THE SAME AS NEW FENCE.

ON TYPE G-2
THE SAME AS

DOUBLE OR
CORNER PANELS

SINGLE OR END PANEL

WING FENCE SHALL BE SECURELY
FASTENED TO PIPE BY 1/2" EYE BOLTS
OR OTHER APPROVED METHOD.

PANELS TO BE SO
LOCATED THAT ANIMALS
CANNOT PASS

REVISED	
EFFECTIVE	3/1/72

STANDARD DRAWING

REFERENCE:
STANDARD SPEC.
SECTION 81

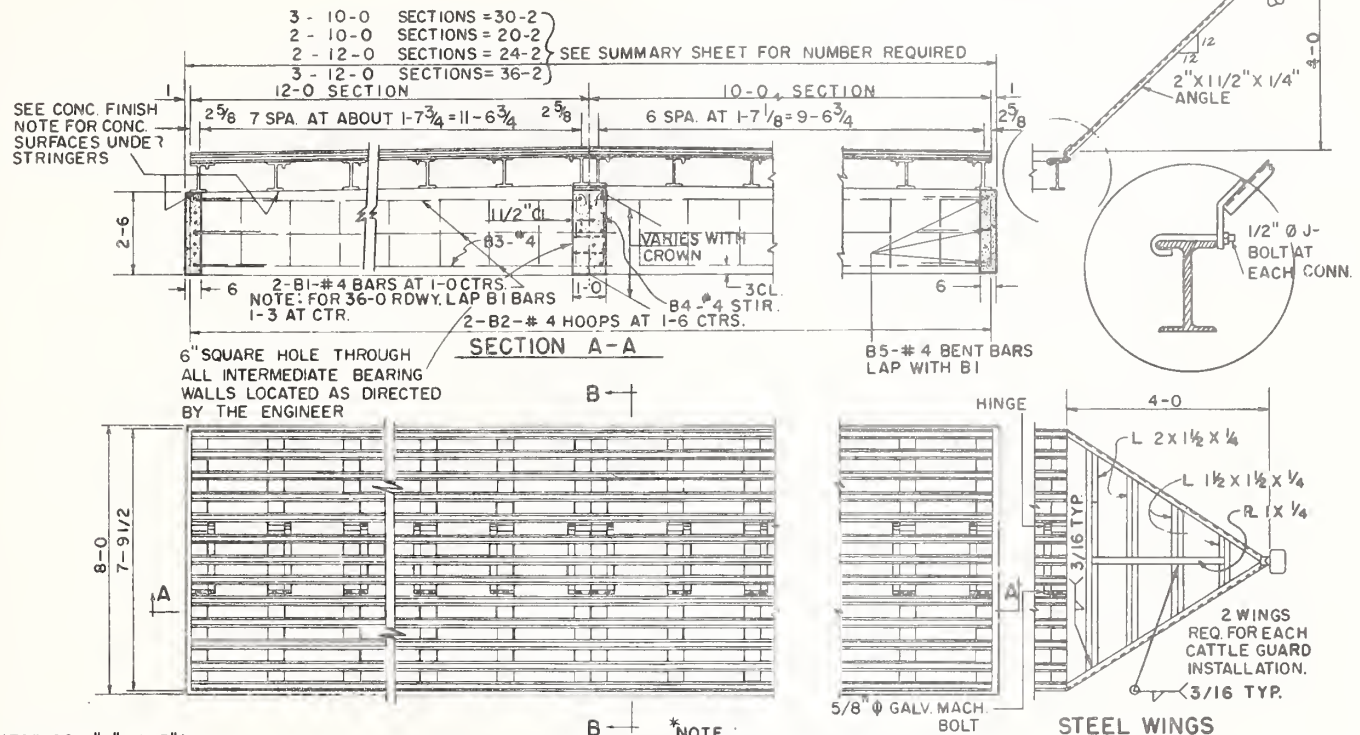
DWG. NO.
78

FARM FENCE

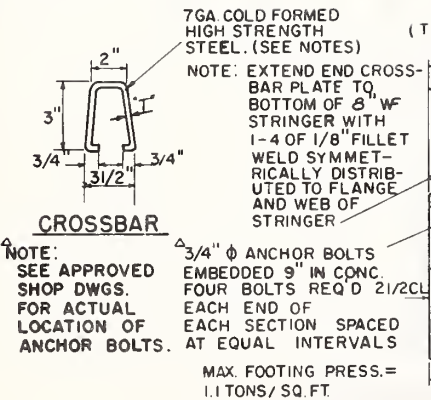
APPROVED: H. J. ANDERSON - DIRECTOR OF HIGHWAYS
BY: [Signature]
ADMINISTRATOR - ENGINEERING DIVISION

STATE	PROJECT NO.	SHEET NO.
MONTANA		

LIVE LOADING: STANDARD (H2O) LOADING

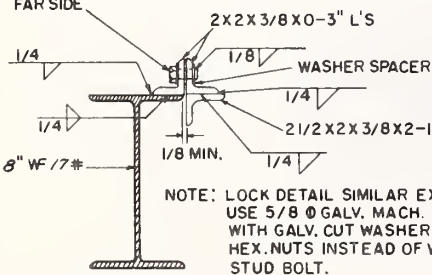


(FOR 7 GA, "T" = .1793")

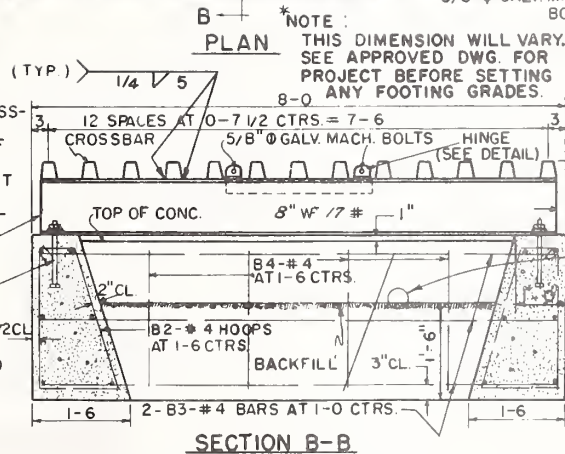


EST. CLASS "A" CONC. QUANTITIES
 24-0 RDWY. = 7 CU. YDS.
 36-0 RDWY. = 11 CU. YDS.
 20-0 RDWY. = 6 CU. YDS.
 30-0 RDWY. = 9 CU. YDS.

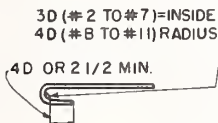
5/8" Ø BOLT WITH CUT WASHERS
 EACH SIDE OF ANGLES. WELD
 SHANK TO WASHER ALL AROUND
 FAR SIDE



HINGE DETAIL



SECTION B-B



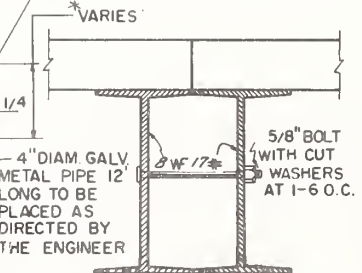
4D OR 2 1/2 MIN.

2 1/2 D = INSIDE RADIUS
 (#2 TO #9 BARS)

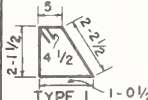




D = DIA. OF BAR

SEE ROAD PLANS FOR FINISHED GRADE
 & CROWN OF ADJ. ROAD SECTIONS.



MULTIPLE
 INSTALLATION JOINT

BILL OF REINFORCING STEEL														
														
20' RDWY.					30' RDWY.									
MK	SIZE	NO.	TYPE	LENGTH	MK	SIZE	NO.	TYPE	LENGTH	MK	SIZE	NO.	TYPE	LENGTH
B1	4	12	STR.	19-10	B1	4	12	STR.	29-10					
B2	4	28	1	6-6	B2	4	42	1	6-6					
B3	4	6	STR.	7-7	B3	4	12	STR.	7-7					
B4	4	4	2	5-11	B4	4	8	2	5-11					
B5	4	6	3	10-7	B5	4	6	3	10-7					
EST. WT. = 369 LBS.					EST. WT. = 556 LBS.									
24' RDWY.					36' RDWY									
B1	4	12	STR.	23-10	B1	4	24	STR.	18-7					
B2	4	34	1	6-6	B2	4	50	1	6-6					
B3	4	6	STR.	7-7	B3	4	12	STR.	7-7					
B4	4	4	2	5-11	B4	4	8	2	5-11					
B5	4	6	3	10-7	B5	4	6	3	10-7					
EST. WT. = 427 LBS.					EST. WT. = 650 LBS.									

STANDARD DRAWING

REFERENCE:
 STANDARD SPEC.
 SECTION 82

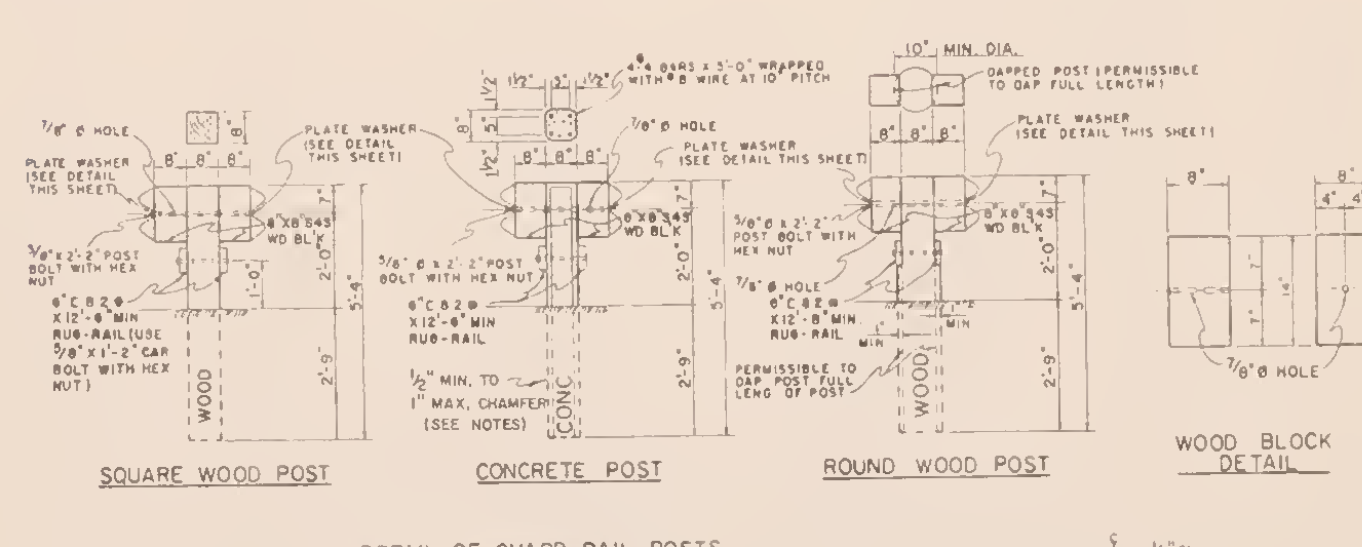
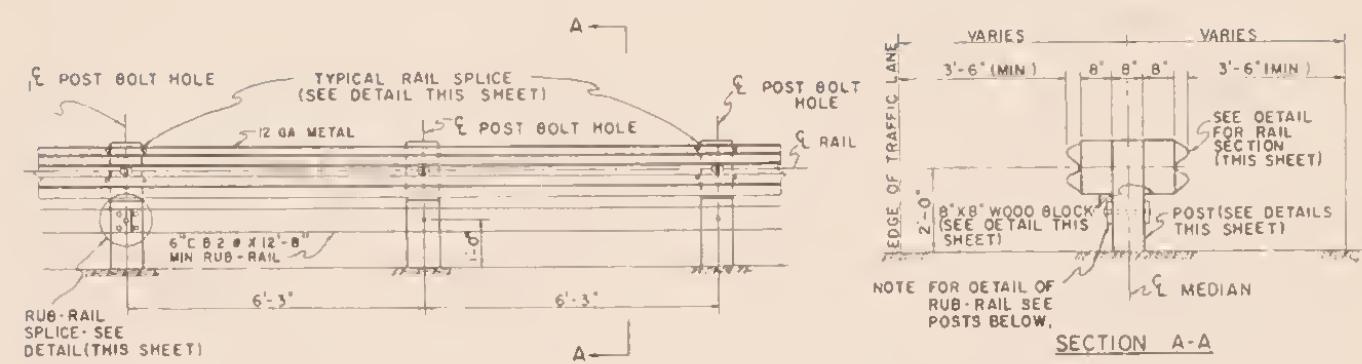
DWG. NO.
 79

CATTLE GUARD

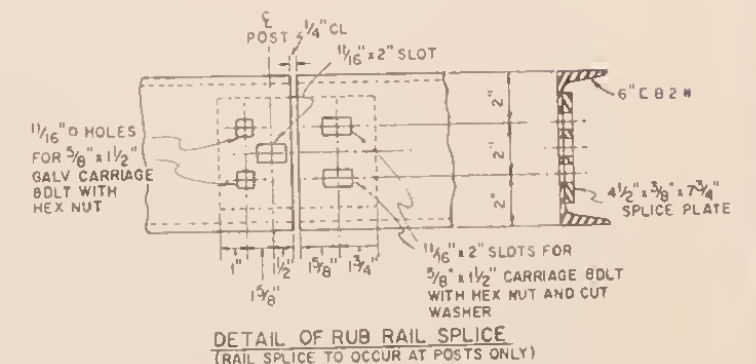
APPROVED: H. J. ANDERSON - DIRECTOR OF HIGHWAYS
 BY: *[Signature]*
 ADMINISTRATOR - ENGINEERING DIVISION

REVISED
 EFFECTIVE 3/11/72

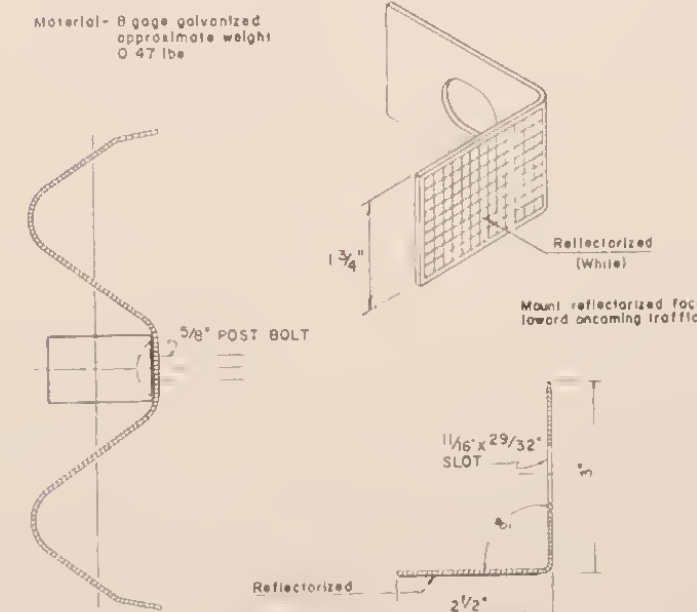
METAL MEDIAN RAIL



DETAIL OF GUARD RAIL POSTS



REFLECTOR - WASHER

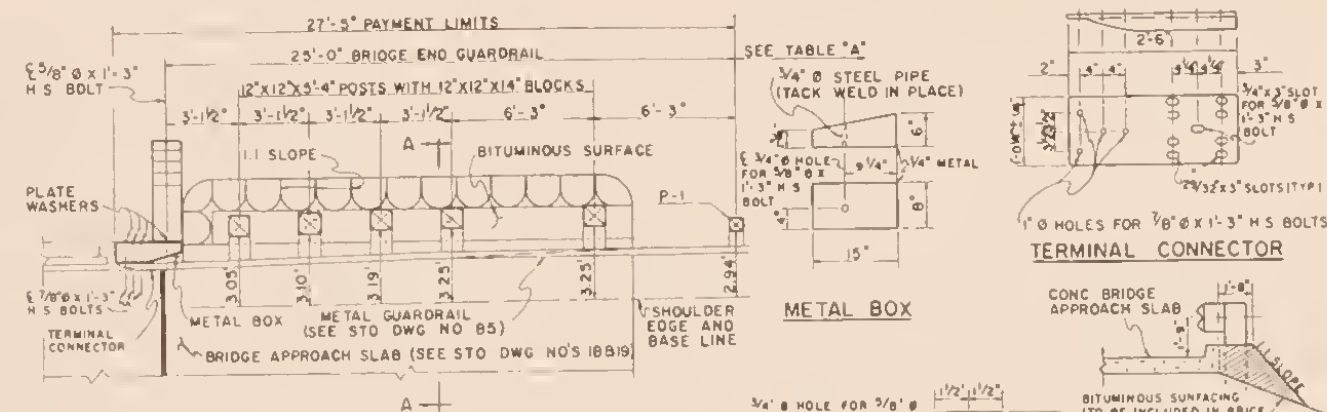


STANDARD DRAWING	
REFERENCE.	DWG. NO.
STANDARD SPEC.	85
SECTION 90	
METAL GUARD AND MEDIAN RAIL	
APPROVED H. J. WILKINSON, DIRECTOR OF HIGHWAYS	
BY <i>[Signature]</i>	
ADMINISTRATOR - ENGINEERING DIVISION	

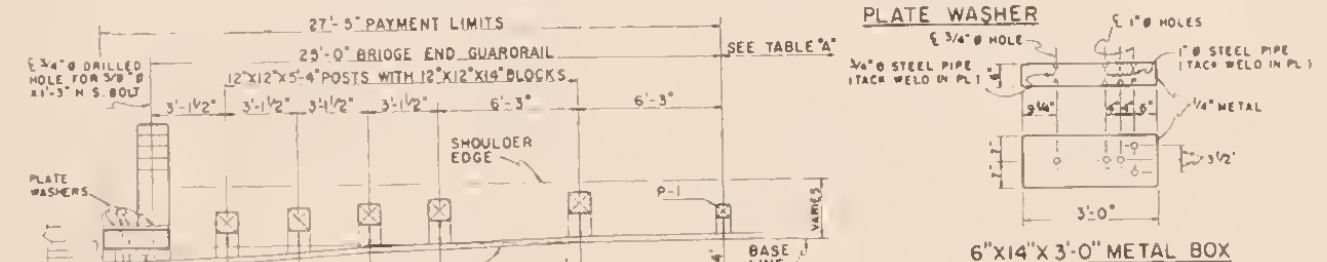
REVISED	
EFFECTIVE	3/1/72

BRIDGE APPROACH SECTIONS WITH WOOD POSTS

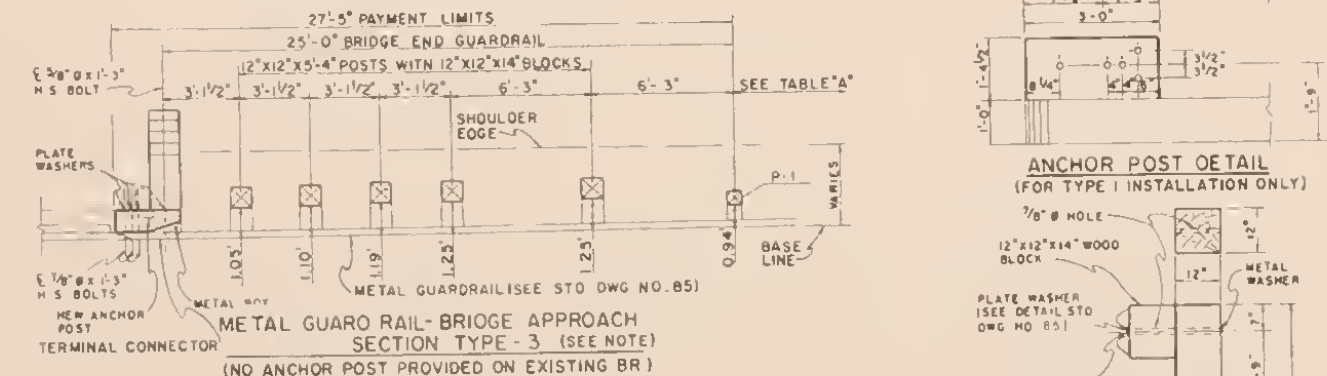
BRIDGE APPROACH SECTIONS WITH CONCRETE POSTS



METAL GUARDRAIL-BRIDGE APPROACH SECTION TYPE-1
(USE FOR NEW BRIDGES ONLY)

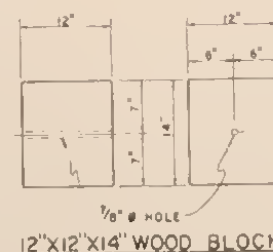


METAL GUARDRAIL-BRIDGE APPROACH SECTION TYPE-2 (SEE NOTE)
(EXISTING ANCHOR POST IN PLACE)



METAL GUARDRAIL-BRIDGE APPROACH SECTION TYPE-3 (SEE NOTE)
(NO ANCHOR POST PROVIDED ON EXISTING BR)

TABLE "A"				
2-LANE TREATMENT	IF RAIL	TYPE-1	TYPE-2	TYPE-3
	CONTINUOUS RAIL	MATCH CONTINUOUS RAIL	MATCH CONTINUOUS RAIL	STD. DWG. NO B9 TERMINAL 4
4-LANE TREATMENT	NON-CONTINUOUS RAIL	STD. DWG. NO B9 TERMINAL 1	STD. DWG. NO B9 TERMINAL 1	STD. DWG. NO. B9 TERMINAL 3
	CONTINUOUS SHOULDER RAIL	MATCH CONTINUOUS RAIL	MATCH CONTINUOUS RAIL	STD. DWG. NO. B9 TERMINAL 4
4-LANE TREATMENT	NON-CONTINUOUS SHLDR. RAIL	STD. DWG. NO. B9 TERMINAL 5	STD. DWG. NO. B9 TERMINAL 5	STD. DWG. NO. B9 TERMINAL 3
	CONTINUOUS MEDIAN RAIL	MATCH CONTINUOUS RAIL	MATCH CONTINUOUS RAIL	STD. DWG. NO. B9 TERMINAL 4
4-LANE TREATMENT	NON-CONTINUOUS MEDIAN RAIL	STD. DWG. NO. B9 TERMINAL 5	STD. DWG. NO. B9 TERMINAL 5	STD. DWG. NO. B9 TERMINAL 3



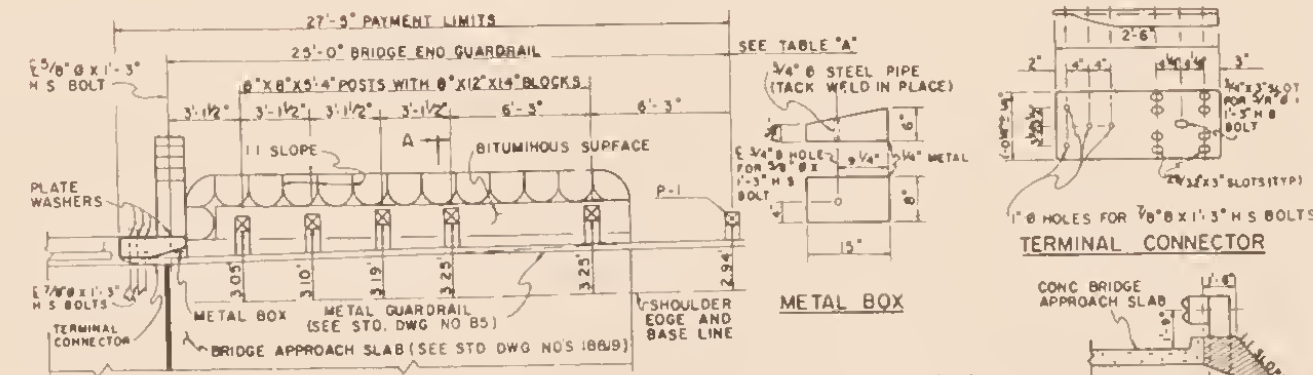
METAL GUARDRAIL-BRIDGE APPROACH SECTION

MEASUREMENT: ONE INSTALLATION COMPLETE AS DETAILED TO BE MEASURED AS ONE UNIT.

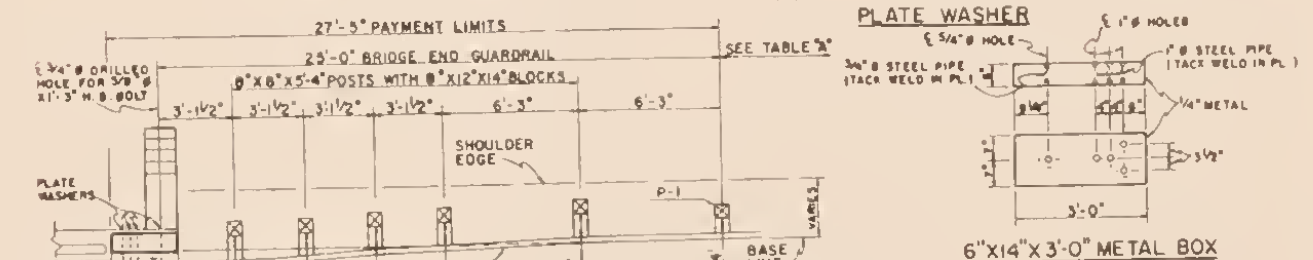
PAYMENT: PER EACH UNIT AS CONTAINED IN BID PROPOSAL

NOTE: THIS STD DWG. IS TO BE USED FOR BRIDGE APPROACH AND/OR DEPARTURE ENDS FOR TWO-WAY TRAFFIC AND FOR APPROACH ENDS FOR ONE-WAY TRAFFIC NORMAL 8" x 8" POSTS AND 6'-3" POST SPACING CAN BE USED FOR ONE-WAY DEPARTURE ENDS.

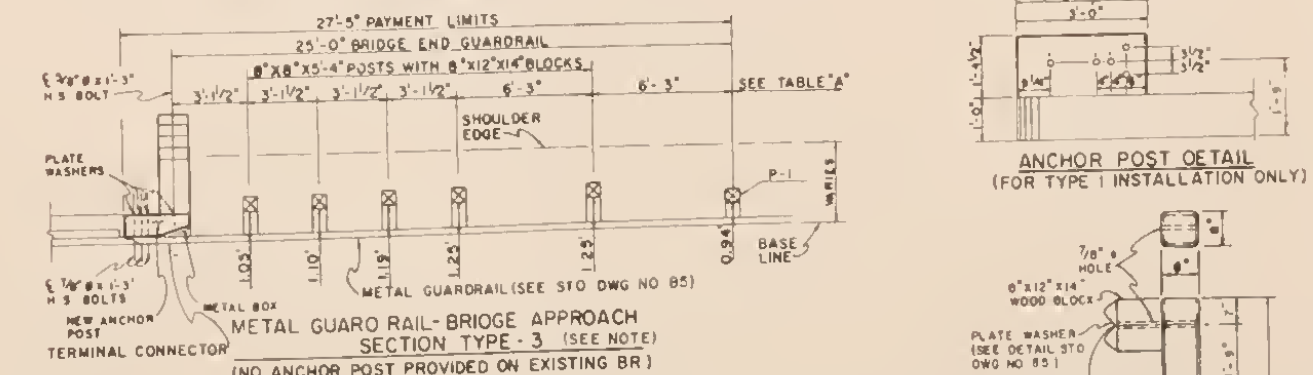
FOR INSTALLATION OF BRIDGE APPROACH SECTIONS TYPE-2 AND TYPE-3 SEE ROAD PLANS FOR DETAILS ON ANCHORAGE.



METAL GUARDRAIL-BRIDGE APPROACH SECTION TYPE-1
(USE FOR NEW BRIDGES ONLY)



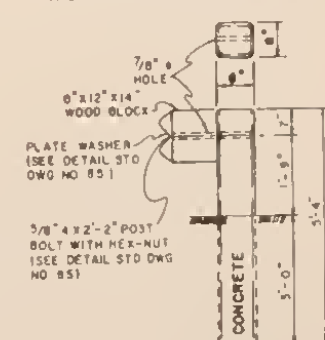
METAL GUARDRAIL-BRIDGE APPROACH SECTION TYPE-2 (SEE NOTE)
(EXISTING ANCHOR POST IN PLACE)



METAL GUARDRAIL-BRIDGE APPROACH SECTION TYPE-3 (SEE NOTE)
(NO ANCHOR POST PROVIDED ON EXISTING BR)



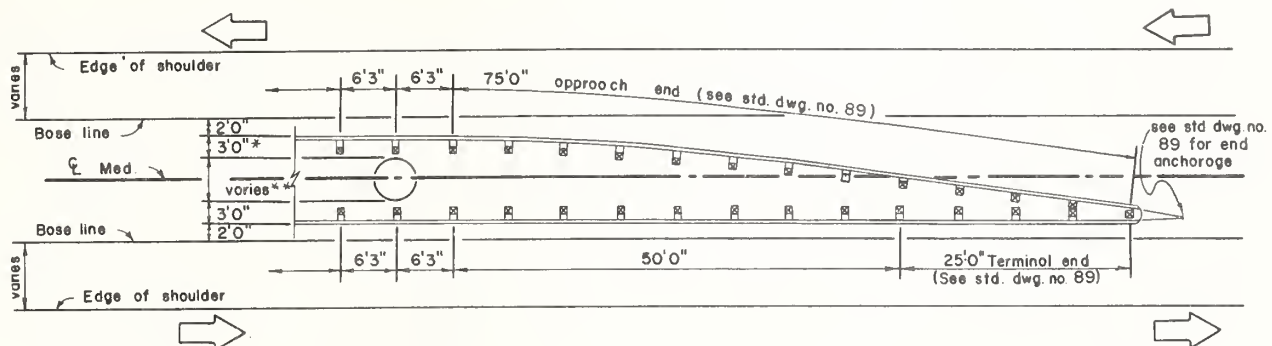
8" x 12" x 14" WOOD BLOCK



8" x 8" CONCRETE POST

STANDARD DRAWING	
REFERENCE.	DWG. NO
STANDARD SPEC.	86
SECTION 90	
BRIDGE END TREATMENT	
APPROVED H. J. ANDERSON - DIRECTOR OF HIGHWAYS	
BY <i>[Signature]</i> ADMINISTRATOR - ENGINEERING DIVISION	

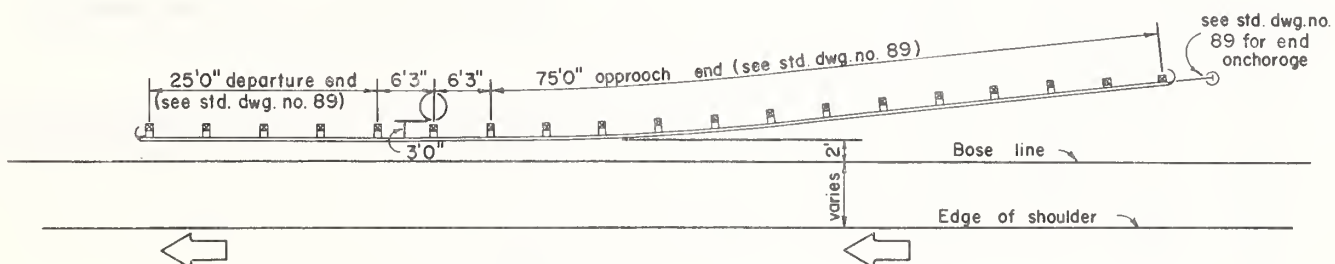
REVISED
EFFECTIVE 3/1/72



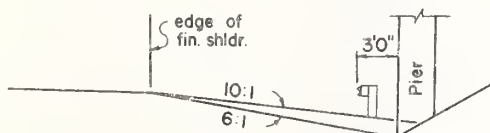
MEDIAN BRIDGE PIER TREATMENT

* This dimension may be greater if pier footings interfere with the guardrail post or if continuous rail is provided on the shoulder.

** When pier width is greater than 3'0", adjust the last eight post offsets of the 75' terminal section to fit the condition.



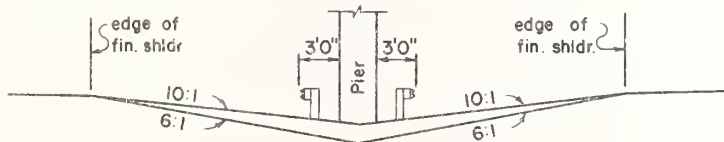
OUTSIDE SHLDR. BRIDGE PIER TREATMENT



OUTSIDE SHOULDER SLOPE

NOTE: Obstruction less than 30' from edge of nearest traffic lane require guardrail.

NOTE: When guardrail installations are more than 2 feet from the edge of the shoulder, the fill slope shall be a 10:1 slope beginning at the edge of finished shoulder.



MEDIAN SLOPE

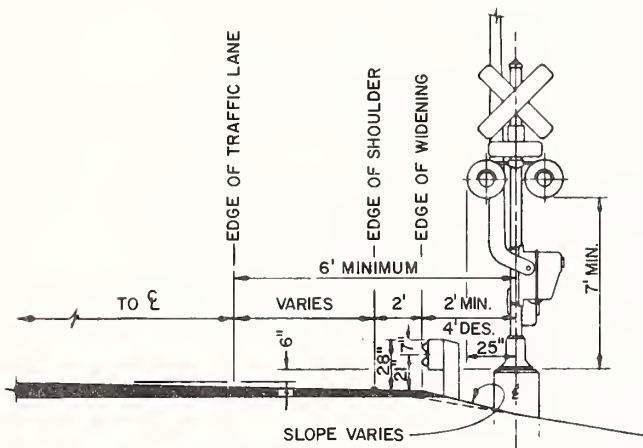
STANDARD DRAWING

REFERENCE: DWG. NO.
STANDARD SPEC. 87
SECTION 90

PIER TREATMENT

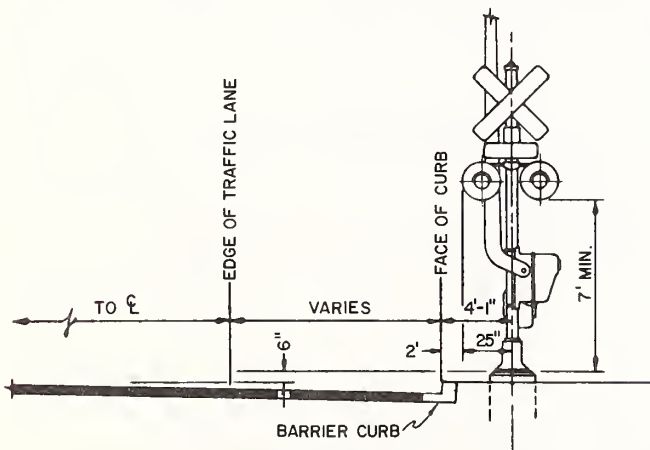
REVISED
EFFECTIVE 3/1/72

APPROVED: H. J. ANDERSON, DIRECTOR OF HIGHWAYS
BY: *John R. B...*
ADMINISTRATOR - ENGINEERING DIVISION

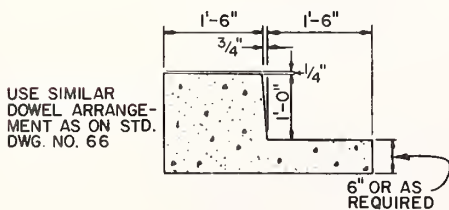


ELEVATION

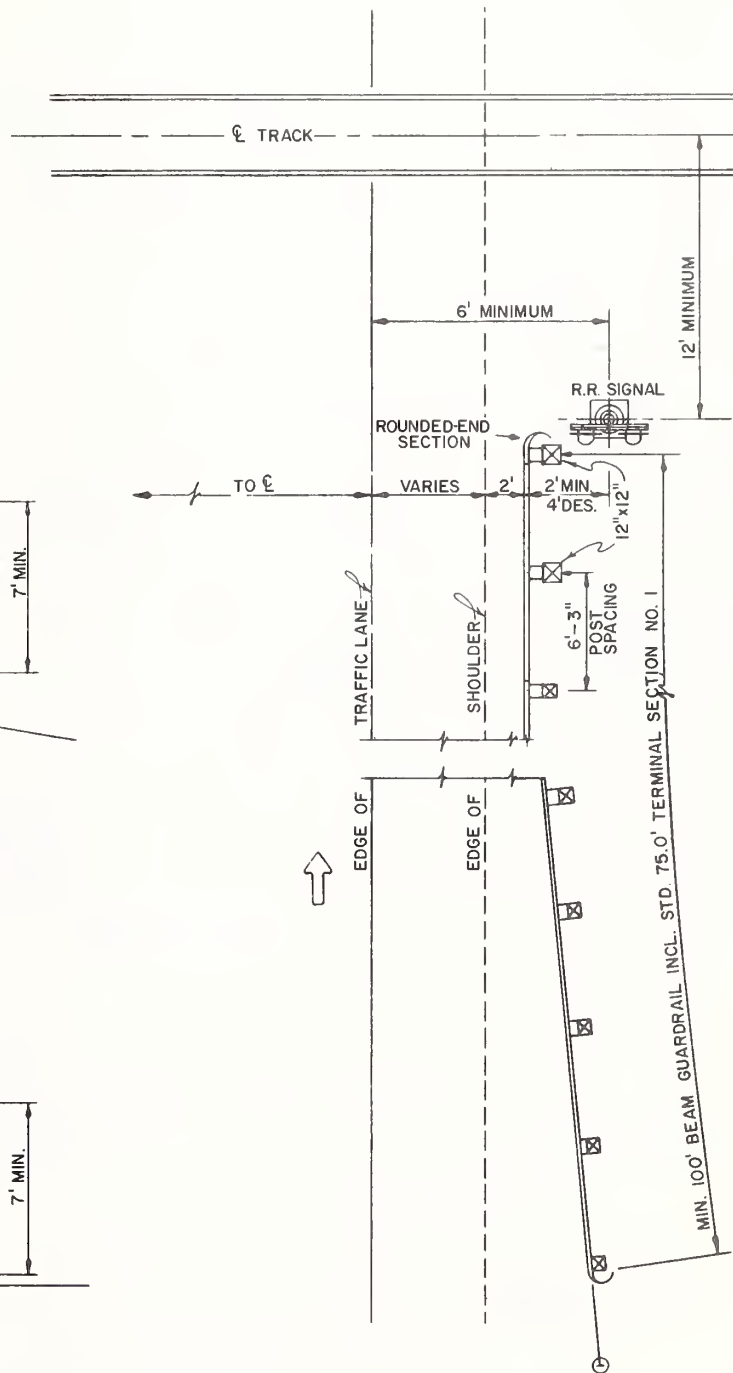
IN EVERY CASE WHERE THERE IS NO BARRIER TYPE CURB, GUARDRAIL SHALL BE INSTALLED UNLESS SUCH INSTALLATION IS FOUND TO BE IMPRACTICAL.



ELEVATION



TYPICAL BARRIER CURB



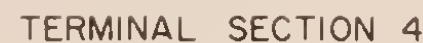
PLAN

SEE BULLETIN NO. 6, "RECOMMENDED PRACTICES FOR RAILROAD-HIGHWAY GRADE CROSSING PROTECTION", ASSOCIATION OF AMERICAN RAILROADS, FOR ADDITIONAL DETAILS & SKEWED CROSSINGS.

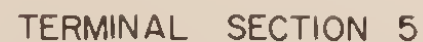
SEE STD. DWG. NO. 89 FOR TERMINAL SECTION DETAILS.

STANDARD DRAWING	
REFERENCE:	DWG. NO.
STANDARD SPEC.	88
SECTION 90	
GUARDRAIL FOR GRADE CROSSING PROTECTION	
APPROVED: H. J. ANDERSON, DIRECTOR OF HIGHWAYS	
BY <i>John D. Roberts</i>	
ADMINISTRATOR-ENGINEERING DIVISION	

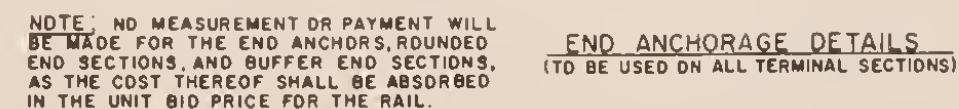
REVISED	
EFFECTIVE	3/1/72



* Post P-1 will match the continuous rail

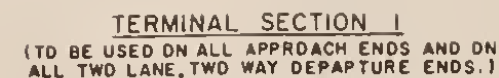


(This Terminal Section to be used for out slope embedment)

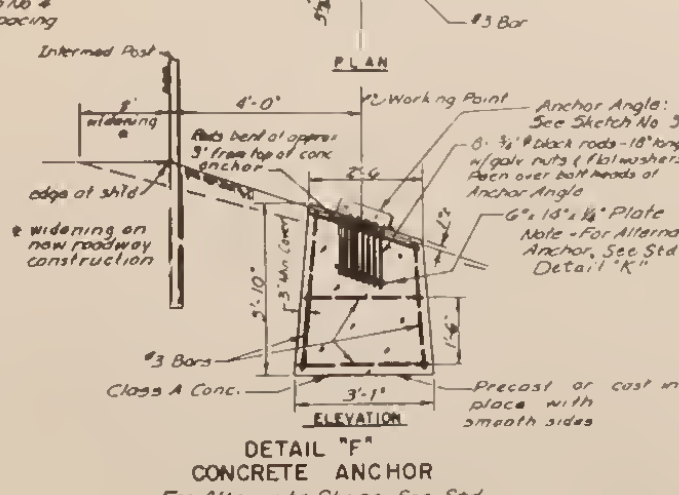
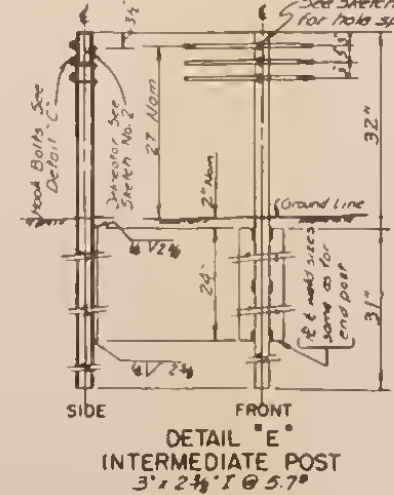
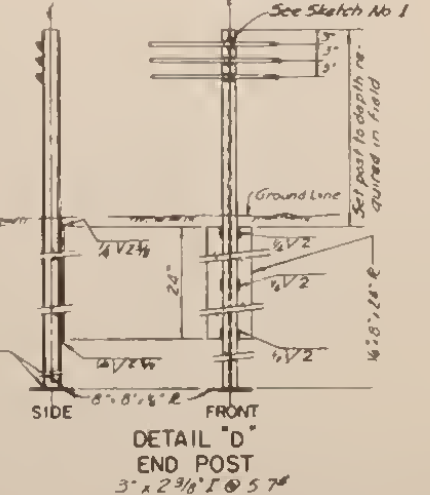
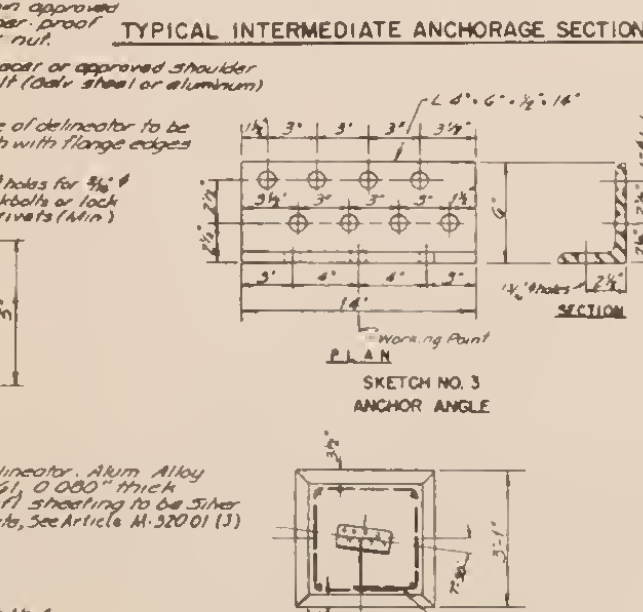
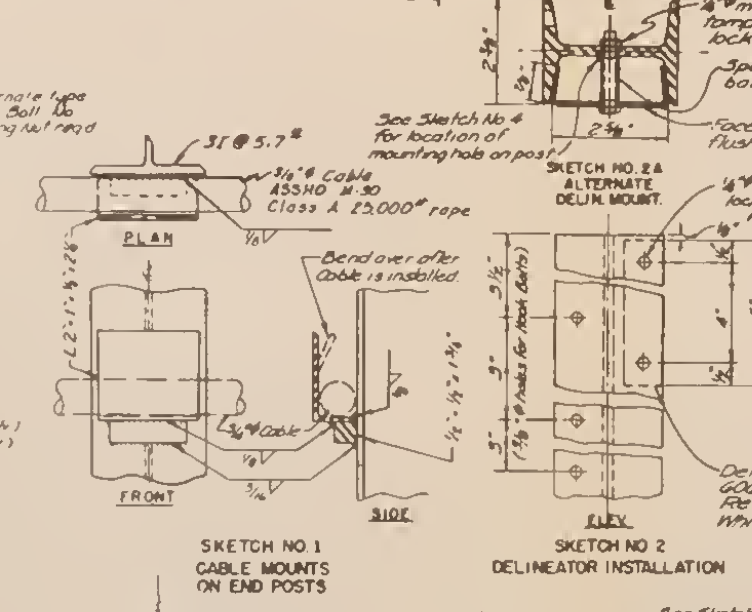
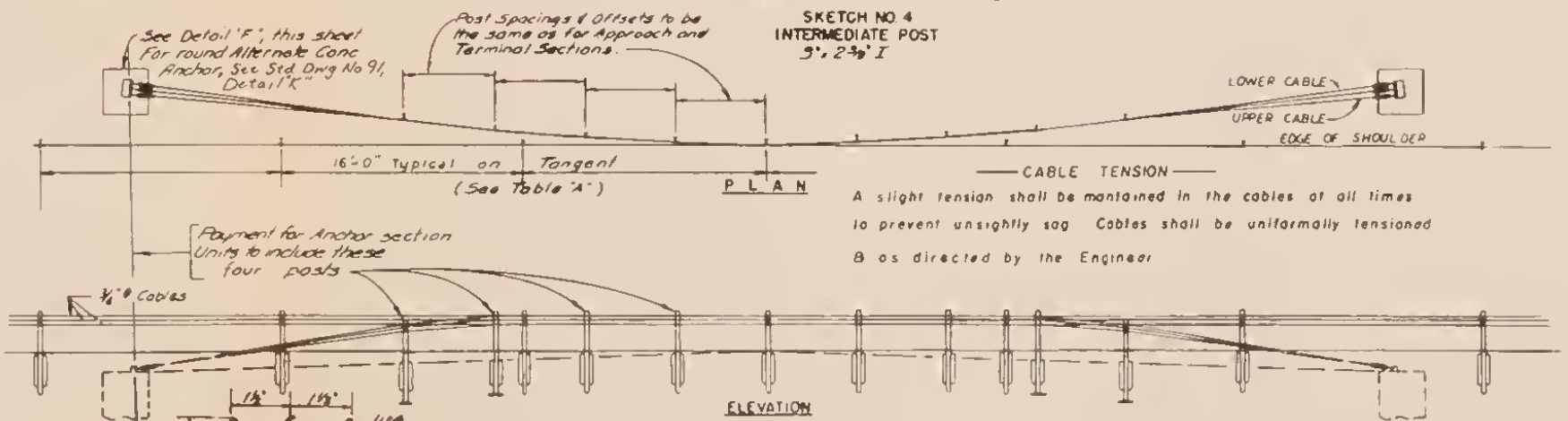
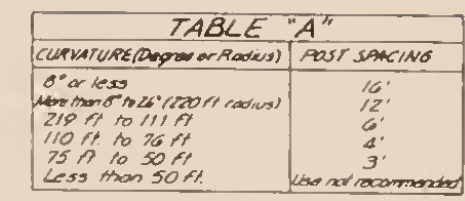


NOTE: CABLE SHALL BE 3/4" CLASS A 25,000*
ROPE- AASHO M-30.

NOTE: WHEN DOUBLE GUARDRAIL ANCHOR IS REQUIRED, BOTH 1 1/4" Ø RODS SHALL BE SECURED TO THE CONCRETE ANCHOR AS SHOWN ON THE ABOVE DETAIL DRAWINGS



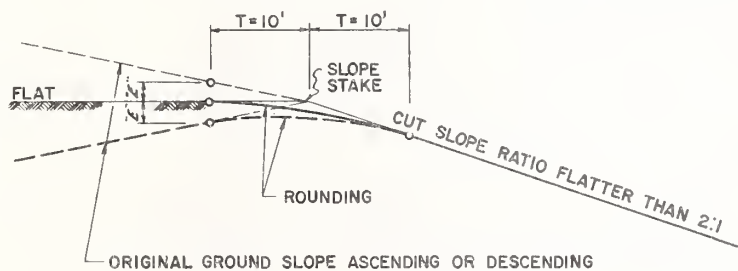
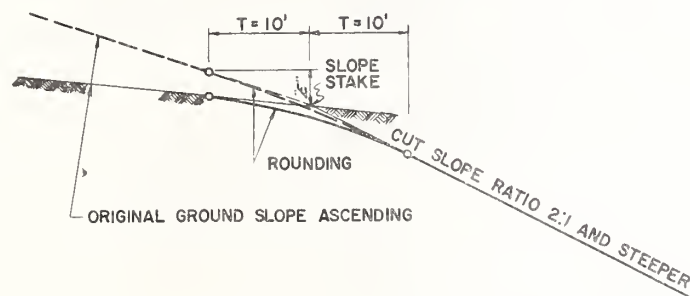
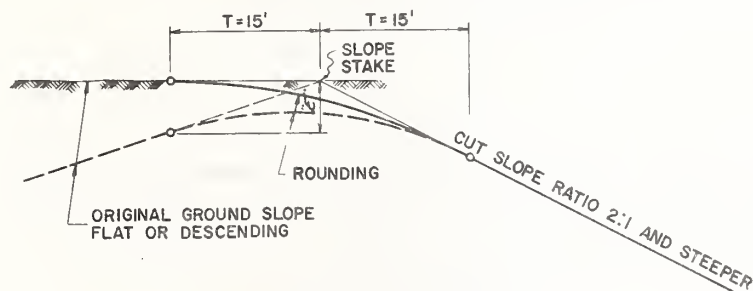
STANDARD DRAWING	
REFERENCE:	DWG. NO.
STANDARD SPEC.	89
SECTION 90	
GUARDRAIL TERMINAL SECTIONS	
APPROVED: H. J. ANDERSON, DIRECTOR OF HIGHWAYS	
BY: <i>Jack P. [Signature]</i>	
ADMINISTRATOR-ENGINEERING DIVISION	



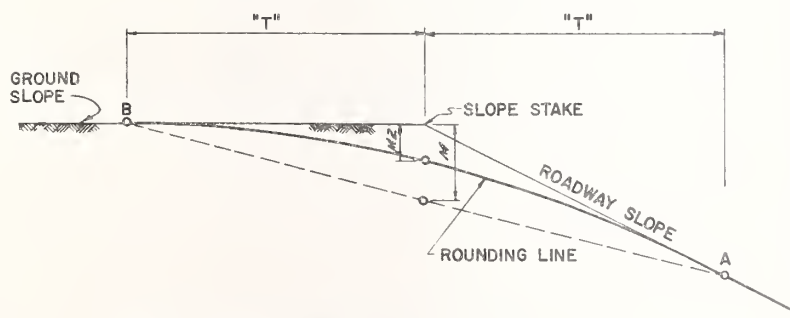
GENERAL NOTES.

1. Intermediate posts shall be 3" x 2 1/2" I Beams @ 57'. Every other intermediate post that is parallel to the edge of port shall be reflected. (See Sketch No. 2) Do not reflect/locate posts in the TYPICAL APPROACH, TERMINAL and INTERMEDIATE ANCHOR SECTIONS.
2. For arrangement of Spring Cable End Assemblies (Compensating Devices) and Turnbuckle Cable End Assemblies, the following criteria shall apply:
 - Length of Cable Runs:
 - To 500' - Use Compensating Device on one end, and turnbuckle on other end of each individual cable
 - Over 500' to 2000' - Use Compensating Device & turnbuckle on each end of each individual cable
 - Over 2000' - Start new stretch by interlacing at last parallel post (See Sketch of Typical Layout above)
3. Cable Splices & Cable Ends shall be positive and of any type and design coinciding with the intent, design & strength of the structure, and meeting with the approval of the Engineer.
4. Fittings - All fittings shall be so designed and be of such section as to develop the full strength of a single cable or cable assemblies, as the case may be.
 - Single Cable Assembly - Min Tensile Strength = 25,000^{lbs}
 - Three Cable Anchorage - " " " " = 100,000^{lbs}
 - All fittings shall be galvanized in accordance with cable guardrail specifications
5. Steel castings shall conform to the requirements of A.S.T.M. Designation A-27. All steel castings shall be Grade 65-35, full annealed. Material indicated as "Malleable Iron" shall conform to Std Spec M-290 17, malleable castings (Grade S5018).
6. Hook bolts, as installed, shall develop an ultimate pull open strength of from 500^{lbs} to 1000^{lbs} applied in a direction normal to the longitudinal axis of the post
7. Cable - 1/2" class A 25,000^{lbs} rope - ASSHO M-30
8. At all locations where the cable is connected to a cable socket with a wedge type connection, one wire of the wire rope shall be crimped over the base of the wedge to hold it firmly in place

STANDARD DRAWING	
REFERENCE	DWG. NO.
STANDARD SPEC.	90
SECTION 90	
CABLE GUARDRAIL	
APPROVED H. J. ANDERSON, DIRECTOR OF HIGHWAYS	
BY <i>[Signature]</i>	
ADMINISTRATOR—ENGINEERING DIVISION	



VERTICAL OFFSETS FROM ROADWAY AND GROUND SLOPES
TO ROUNDING LINES FOR CUTS



NOTE: VERTICAL OFFSETS "M₂" SHALL BE M_2

M2-C SLOPES 2:1 & STEEPER (T=15')							
VERT. DIST. "E" (FT.)	DESCENDING GROUND-CUTS						
	$M_2 = M_2$ (FT.)						
	$\frac{3}{4}$:1	1:1	$1\frac{1}{4}$:1	$1\frac{1}{2}$:1	$1\frac{3}{4}$:1	2:1	
FLAT	5.0	3.8	3.0	2.5	2.2	1.9	
2.0	5.5	4.3	3.5	3.0	2.7	2.4	
4.0	6.0	4.8	4.0	3.5	3.2	2.9	
6.0	6.5	5.3	4.5	4.0	3.7	3.4	
8.0	7.0	5.8	5.0	4.5	4.2	3.9	
10.0	7.5	6.3	5.5	5.0	4.7	4.4	
12.0	8.0	6.8	6.0	5.5	5.2	4.9	
14.0	8.5	7.3	6.5	6.0	5.7	5.4	
16.0	9.0	7.8	7.0	6.5	6.2	5.9	

M2-C SLOPES 2:1 & STEEPER (T=10')							
VERT. DIST. "E" (FT.)	ASCENDING GROUND-CUTS						
	$M_2 = M_2$ (FT.)						
	$\frac{3}{4}$:1	1:1	$1\frac{1}{4}$:1	$1\frac{1}{2}$:1	$1\frac{3}{4}$:1	2:1	
1.0	3.4	2.5	2.0	1.7	1.4	1.3	
2.0	2.9	2.0	1.5	1.2	0.9	0.8	
4.0	2.4	1.5	1.0	0.7	0.4	0.3	
6.0	1.0	1.0	0.5	0.2	0.0	0.0	
8.0	1.4	0.5	0.0	0.0			
10.0	0.9	0.0					
12.0	0.4						
14.0	0.0						

M2 FOR CUT SLOPES FLATTER THAN 2:1 (T=10')							
VERT. DIST. "E" (FT.)	DESCENDING GROUND-CUTS						
	$M_2 = M_2$ (FT.)						
	$2\frac{1}{2}$:1	3:1	$3\frac{1}{2}$:1	4:1	5:1	6:1	
FLAT	1.0	0.8	0.7	0.6	0.5	0.4	
1.0	1.3	1.1	1.0	0.9	0.8	0.7	
2.0	1.5	1.3	1.2	1.1	1.0	0.9	
3.0	1.8	1.6	1.5	1.4	1.3	1.2	
4.0	2.0	1.8	1.7	1.6	1.5	1.4	
5.0	2.3	2.1	2.0	1.9	1.8	1.7	
6.0	2.5	2.3	2.2	2.1	2.0	1.9	
7.0	2.8	2.6	2.5	2.4	2.3	2.2	
8.0	3.0	2.8	2.7	2.6	2.5	2.4	
9.0	3.3	3.1	3.0	2.9	2.8	2.7	
10.0	3.5	3.3	3.2	3.1	3.0	2.9	

M2 FOR CUT SLOPES FLATTER THAN 2:1 (T=10')							
VERT. DIST. "E" (FT.)	ASCENDING GROUND-CUTS						
	$M_2 = M_2$ (FT.)						
	$2\frac{1}{2}$:1	3:1	$3\frac{1}{2}$:1	4:1	5:1	6:1	
FLAT	1.0	0.8	0.7	0.6	0.5	0.4	
1.0	0.8	0.6	0.5	0.4	0.3	0.2	
2.0	0.5	0.3	0.2	0.1	0.0	0.0	
3.0	0.3	0.0	0.0	0.0			
4.0	0.0						
5.0							
6.0							
7.0							
8.0							
9.0							
10.0							

STANDARD DRAWING

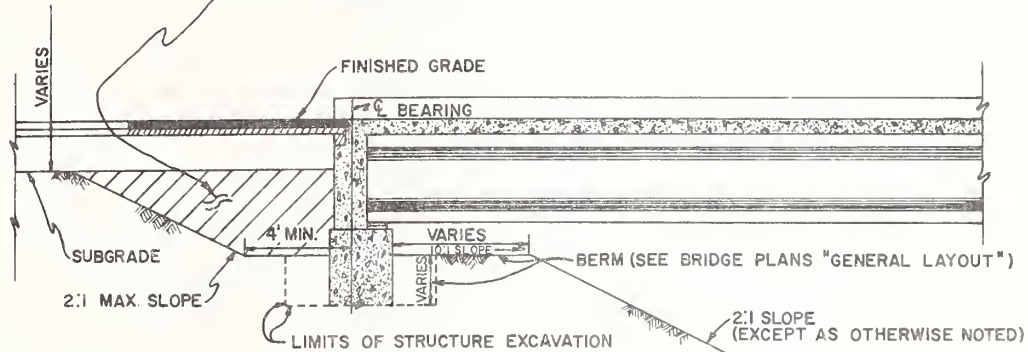
REFERENCE: DWG. NO. 100
STANDARD SPEC. SECTION 11

SLOPE ROUNDING

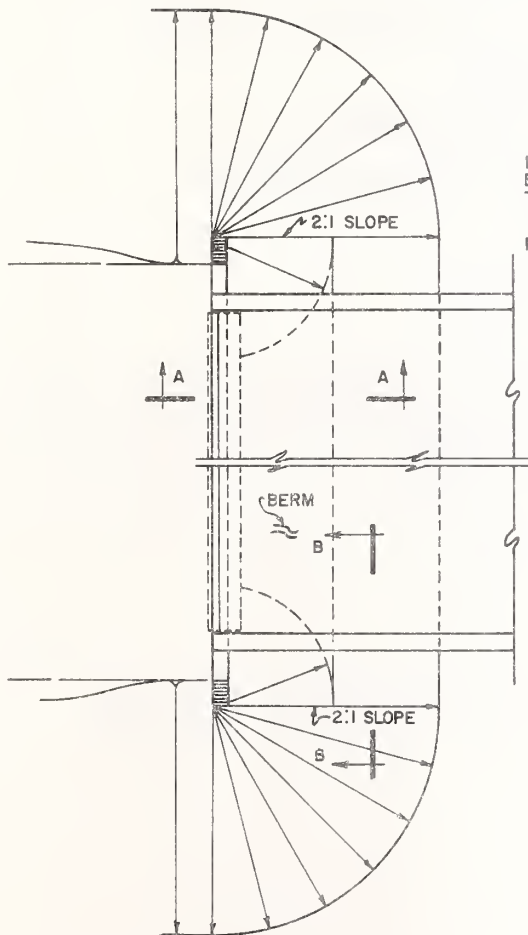
APPROVED: H. L. ANDERSON-DIRECTOR OF HIGHWAYS
BY: *[Signature]*
ADMINISTRATOR-ENGINEERING DIVISION

REVISED
EFFECTIVE 3/1/72

THE GRADING CONTRACTOR SHALL NOT PLACE THIS PORTION OF THE ROADWAY EMBANKMENT UNTIL AFTER THE BRIDGE CONTRACTOR HAS COMPLETED THE BACKWALL AND DECK SLAB. ALL MATERIAL SHALL BE LAYER PLACED AND COMPACTED IN ACCORDANCE WITH ARTICLE 11.04(B) OF THE STANDARD SPECS.

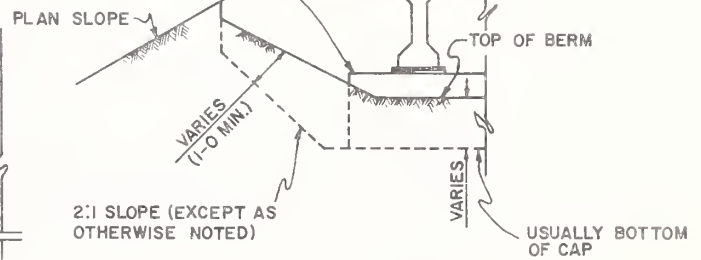


SECTION A-A



PLAN VIEW AT FINISHED BRIDGE END

NOTE: FILL MATERIAL MUST BE KEPT OFF THE TOP OF THE CONCRETE CAP



VIEW B-B
AT FINISHED BRIDGE END

STANDARD DRAWING

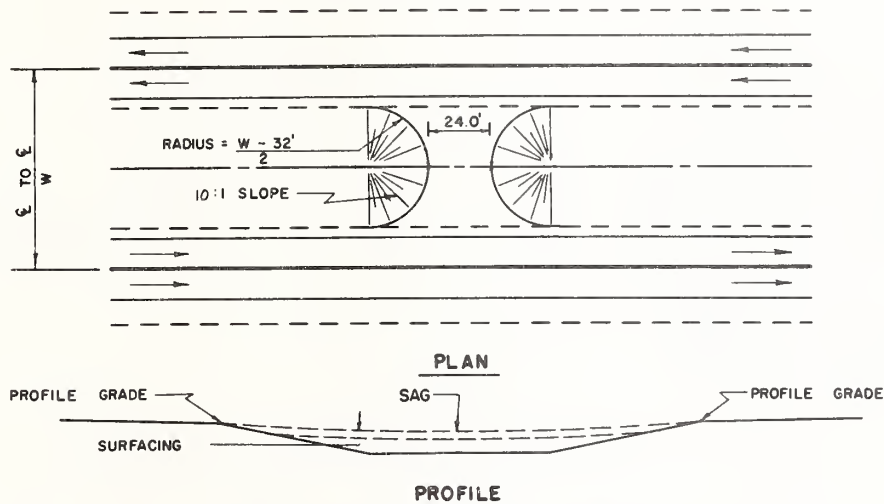
REFERENCE : DWG. NO.
STANDARD SPEC. 101
SECTION 11

ROADWAY EMBANKMENT
AT BRIDGE END

APPROVED: H. J. ANDERSON - DIRECTOR OF HIGHWAYS
BY *[Signature]*
ADMINISTRATOR - ENGINEERING DIVISION

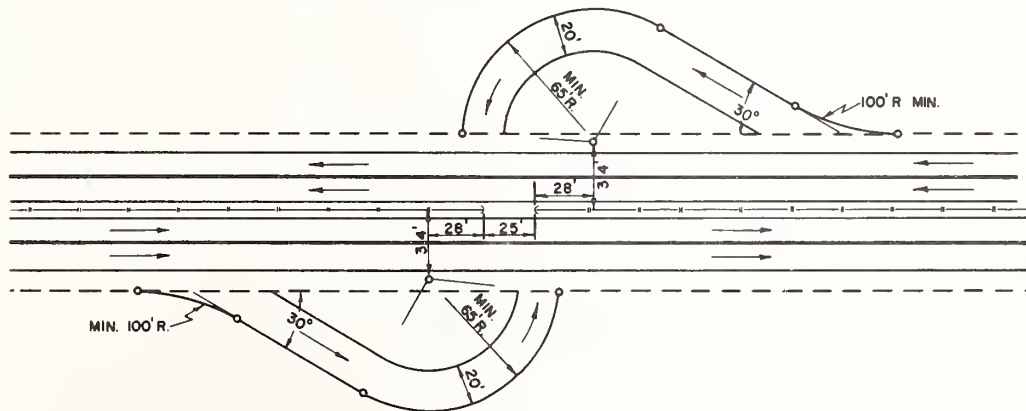
REVISED
EFFECTIVE 3/1/72

MEDIAN WIDTHS 36' TO 76'




NOTE: Turnouts above to be located and constructed in conjunction with ditch blocks if at all possible. Drainage shall be provided when necessary.

STANDARD U-TURN FOR NARROW MEDIANS

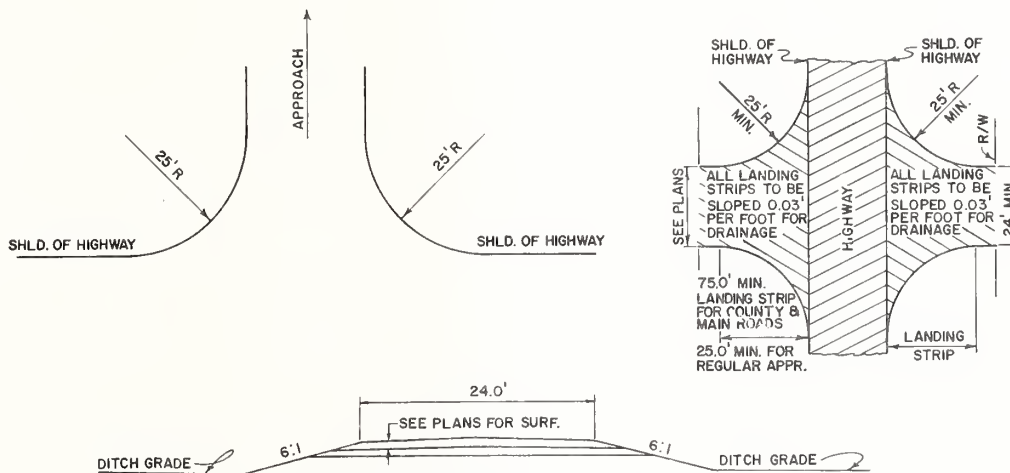


NOTES:

Narrow medians, median widths greater than 76 ft. and independent roadways require special design.
 GRADES: Uniform between inside shoulders of main traveled way except for special design.
 SURFACING: See plans for quantities.
 DRAINAGE: Use 18" or 24" culverts if required.

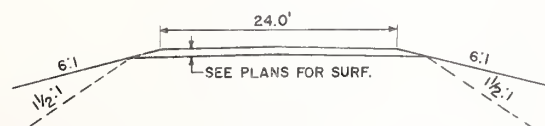
STANDARD DRAWING	
REFERENCE:	DWG. NO.
STANDARD SPEC.	102
SECTION II	
U-TURN MEDIAN OPENINGS ON CONTROLLED ACCESS HIGHWAYS	
APPROVED: H. J. ANDERSON-DIRECTOR OF HIGHWAYS	
BY: 	
ADMINISTRATOR-ENGINEERING DIVISION	

REVISED			
EFFECTIVE	3/1/72		



TYPICAL SECTION AT 25' DITCH LINE

FOR DRAINAGE-PIPE AS NECESSARY



TYPICAL SECTION IN THOROUGH FILL
USE 6:1 SLOPE FOR FILLS OF 5' OR LESS

GRADE OF APPROACH NOT TO EXCEED 10% UNLESS TRAFFIC VOLUME AND COST INDICATE SUCH TO BE JUSTIFIABLE.

APPROACHES TO BE CONSTRUCTED TO FIT LOCAL CONDITIONS, BUT IN SUCH MANNER AS TO MINIMIZE TRAFFIC HAZARD AND AFFORD SAFE AND COMMODIOUS ENTRY AND EXIT OF TRAFFIC TO AND FROM MAIN ROAD.

WHERE IT BECOMES NECESSARY TO GO BEYOND RIGHT-OF-WAY LINES, WRITTEN PERMISSION SHALL BE SECURED FROM PROPERTY OWNER IN ALL INSTANCES.

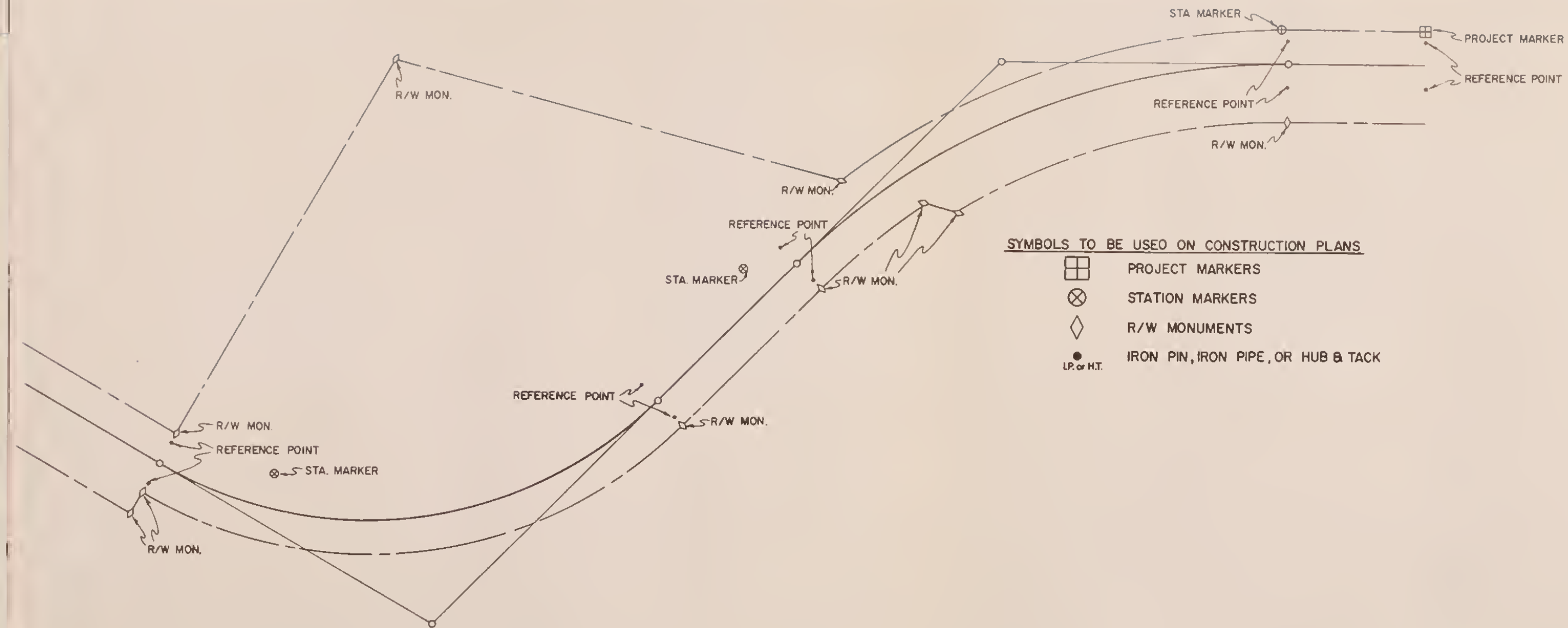
STANDARD DRAWING

REFERENCE : DWG. NO. 103
STANDARD SPEC.
SECTION 20





APPROACHES

APPROVED: H. J. ANDERSON-DIRECTOR OF HIGHWAYS
BY: *[Signature]*
ADMINISTRATOR-ENGINEERING DIVISION

REVISED
EFFECTIVE 3/1/72



SYMBOLS TO BE USED ON CONSTRUCTION PLANS

-  PROJECT MARKERS
-  STATION MARKERS
-  R/W MONUMENTS
-  IRON PIN, IRON PIPE, OR HUB & TACK

BRONZE TABLET EXPOSED SURFACES OF THE TABLET ARE TO BE GROUND SMOOTH. LETTERS ARE TO BE RECESSED 1/16". INFORMATION ON THE TABLET, INDICATED BY PIN LINES, IS TO BE STAMPED IN THE FIELD BY THE ENGINEERING PARTY AFTER POST IS PLACED, USING 3/16" LETTERS.

PROJECT MARKERS ARE TO BE SET AT THE BEGINNING AND END OF ALL PROJECTS ON EITHER SIDE OF THE HIGHWAY.

PROJECT MARKER POSTS TO BE REINFORCED CONCRETE, CORNERS CHAMFERED 1/2". PROJECT NUMBER PLATE TO BE FURNISHED AND ERECTED BY STATE FORCES. SERIES "D" LETTERS AND NUMERALS TO BE USED AS PER STANDARD ALPHABETS PUBLISHED BY BUREAU OF PUBLIC ROADS, 1966.

RIGHT-OF-WAY MONUMENTS WILL BE SET AT ALL POINTS WHERE THE WIDTH OF THE RIGHT-OF-WAY CHANGES, AND AT ANGLE POINTS, THE P.C. AND P.T. OF SIMPLE CURVES, AND THE T.S. AND S.T. OF SPIRAL CURVES. WHEN IT SEEMS UNDESIRABLE TO USE THE CONCRETE MONUMENTS, AS ON LOT OR BLOCK LINES IN SOME PARTS OF A TOWN, CONCRETE MONUMENTS WILL BE OMITTED AND IRON PIPES OR PINS WILL BE PLACED BY MONTANA DEPARTMENT OF HIGHWAY FORCES.

CONCRETE
RUBBED FINISH ON FACE, 4" X 4" SQUARE, RECESSED LETTERS 1" HIGH; CORNERS CHAMFERED 1/2".

REFERENCE POINTS ARE TO BE SET ON BOTH SIDES OF THE CENTERLINE AT THE BEGINNING AND END OF ALL PROJECT, AT ALL P.C., P.T. AND ANGLE POINTS AND AT SUCH HIGH POINTS ON LONG TANGENTS AS MAY BE DESIRABLE. EXCEPT AT PROJECT MARKERS, THEY ARE TO BE AT ANY CONVENIENT DISTANCE FROM THE CENTERLINE.

REFERENCE PIN
1" IRON PIN, ANOTHER REFERENCE POINT TO BE SET ON OPPOSITE SIDE OF HIGHWAY.

STATION MARKERS ARE TO BE SET OPPOSITE EVERY TENTH STATION AND AT IMPORTANT EQUATIONS. EQUATIONS OF LESS THAN 100' MAY BE DISREGARDED. MARKERS ARE TO BE SET ON THE NORTH OR WEST SIDE OF THE CENTERLINE DEPENDING ON THE GENERAL DIRECTION OF THE ROUTE OR SHALL BE SET SO AS TO BE VISIBLE FROM THE HIGHWAY CENTERLINE (ON R/W LINE IF POSSIBLE).

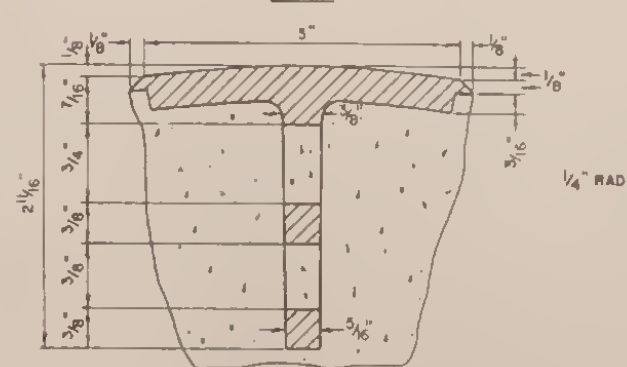
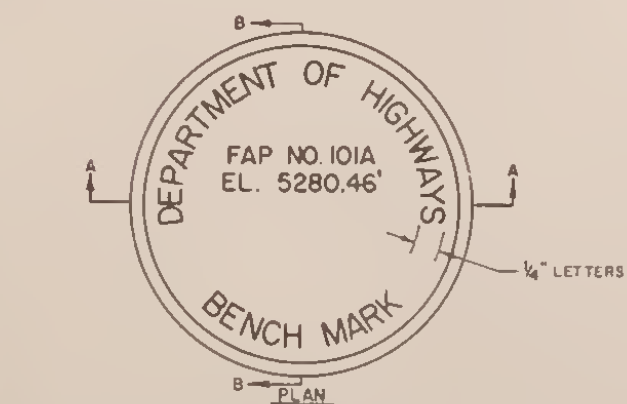
CONCRETE
RUBBED FINISH ON FACE, RECESSED LETTERS 3" HIGH EXCEPT EQUATIONS WHICH WILL BE 1 1/2" HIGH, CORNERS CHAMFERED 1/2".

GENERAL -- REFERENCE POINTS, PROJECT AND STATION MARKERS SHOULD BE SO PLACED THAT THEY WILL NOT BE DISTURBED BY MAINTENANCE OPERATIONS. PROJECT AND STATION MARKERS SHOULD BE PLAINLY VISIBLE FROM THE HIGHWAY.

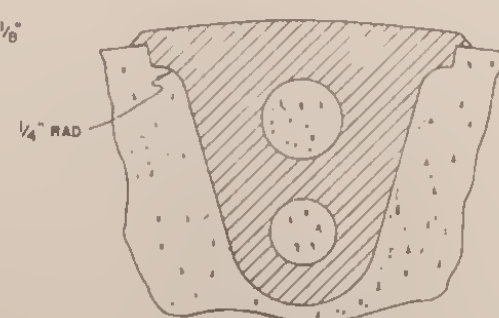
RIGHT-OF-WAY MONUMENTS NOT TO BE ORDERED BY CONTRACTOR UNTIL CHECKED IN FIELD BY THE ENGINEER.

RIGHT-OF-WAY MONUMENTS TO BE PLACED SO THAT OUTSIDE FACE OF MONUMENT COINCIDES WITH RIGHT-OF-WAY LINE.

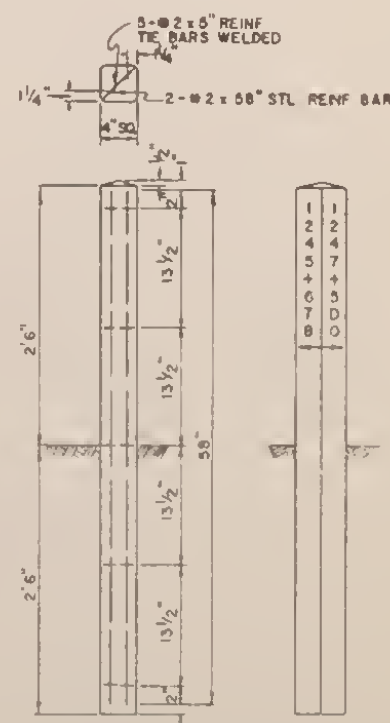
ALL CONCRETE SHALL BE CLASS "DD" OR EQUAL.



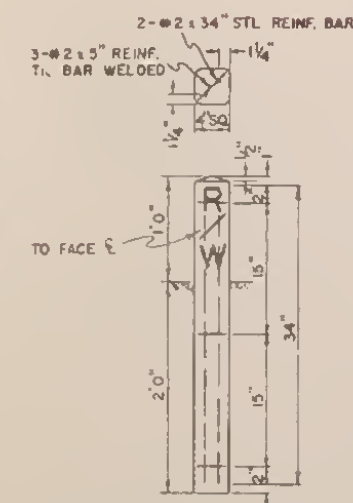
SECTION A-A
BRONZE TABLET
TO BE SET IN TOP OF PROJECT MARKER



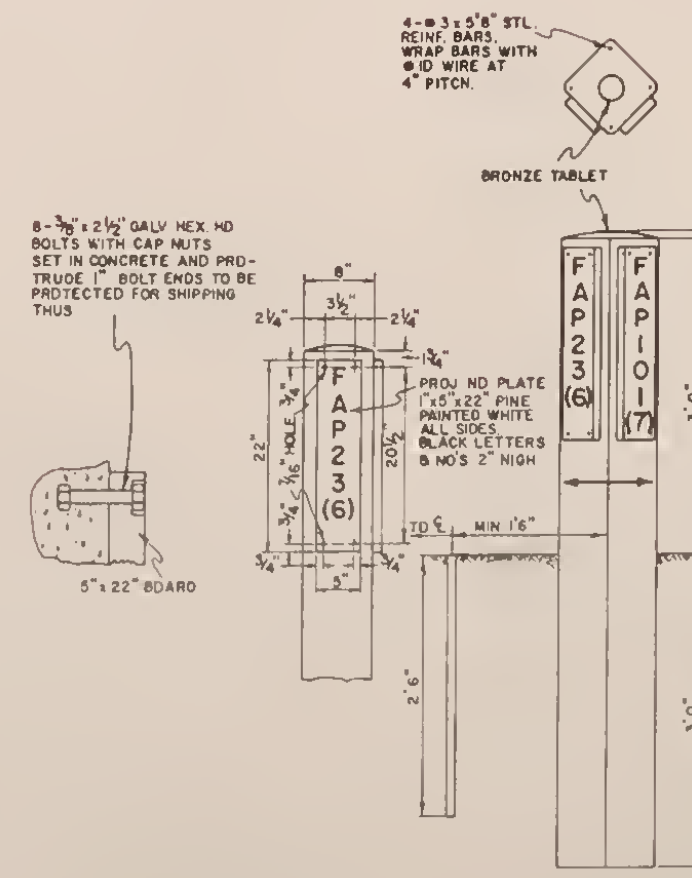
SECTION B-B



STATION MARKER



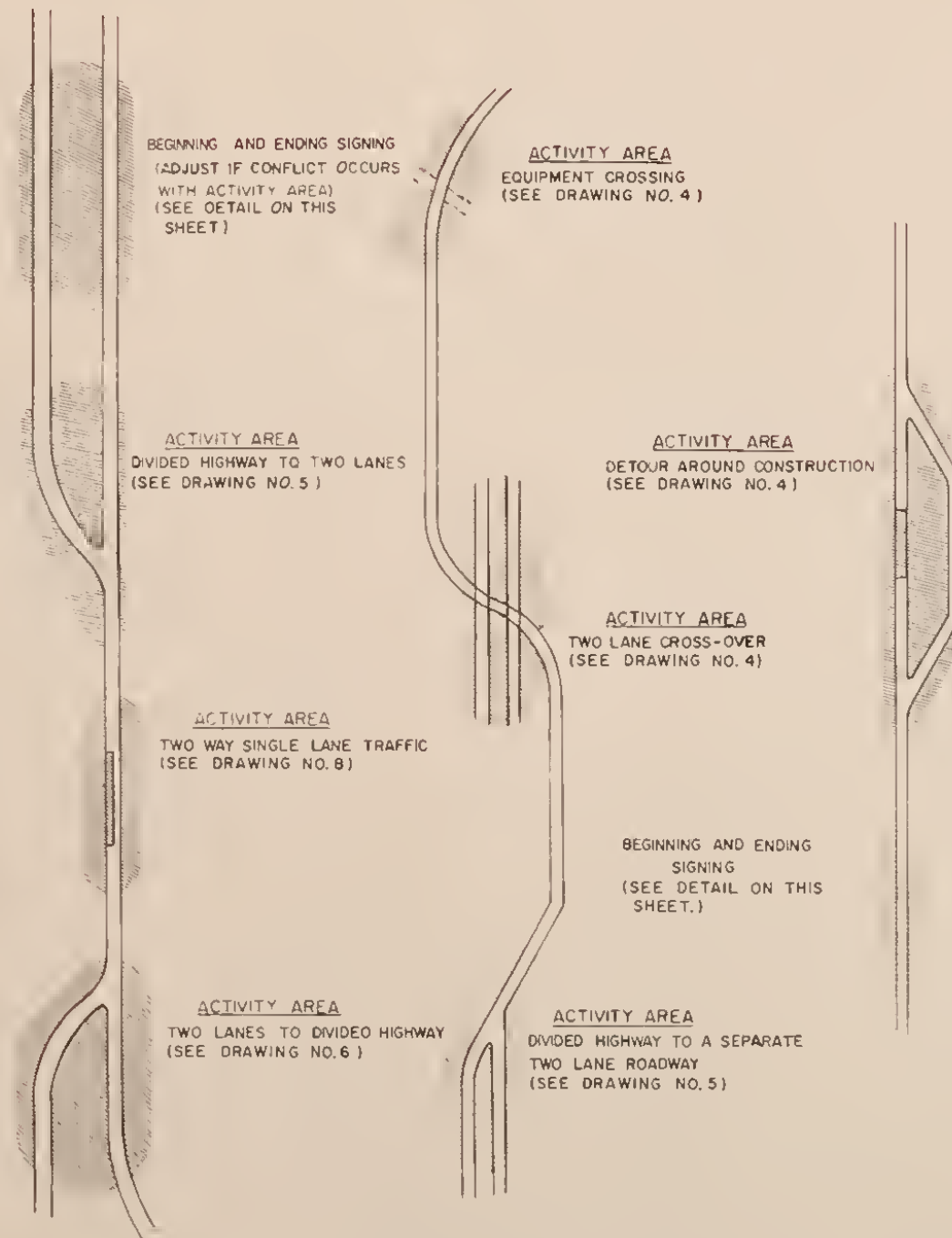
RIGHT-OF-WAY MONUMENT



PROJECT MARKER

REVISED
EFFECTIVE 3/1/72

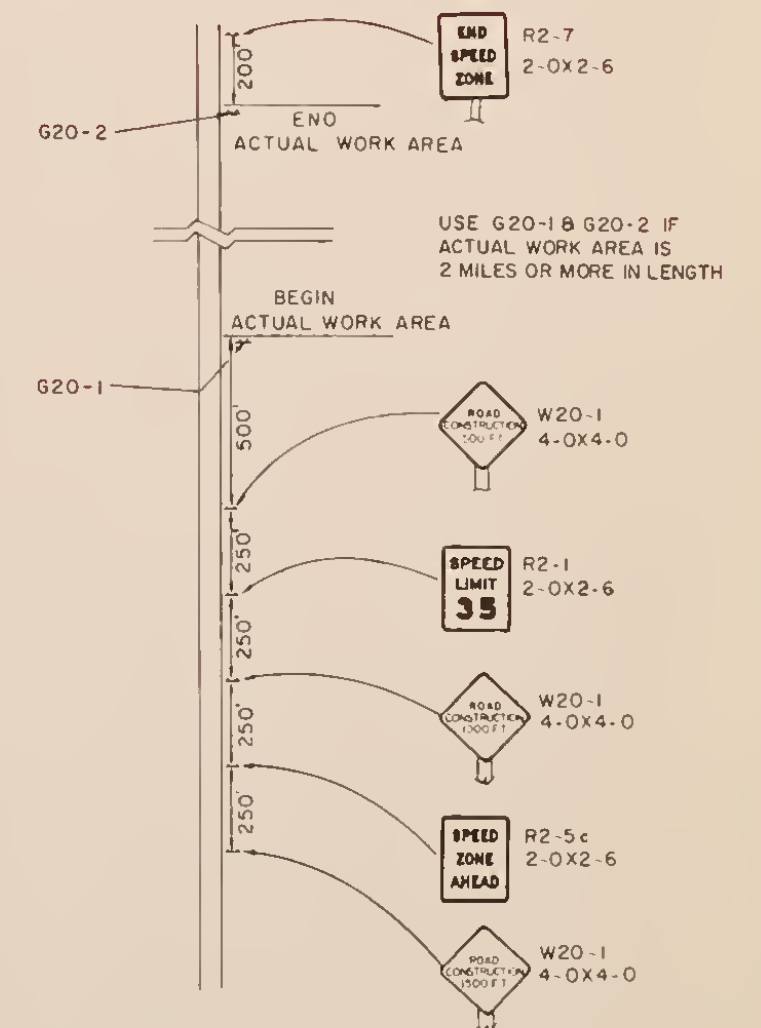
STANDARD DRAWING	
REFERENCE: STANDARD SPEC. SECTION 96	DWG. NO. 104
MONUMENTS & MARKERS	
APPROVED: <i>[Signature]</i> DIRECTOR OF HIGHWAYS	
ADMINISTRATOR - ENGINEERING DIVISION	



PLAN OF TYPICAL CONSTRUCTION AREAS

GENERAL NOTES

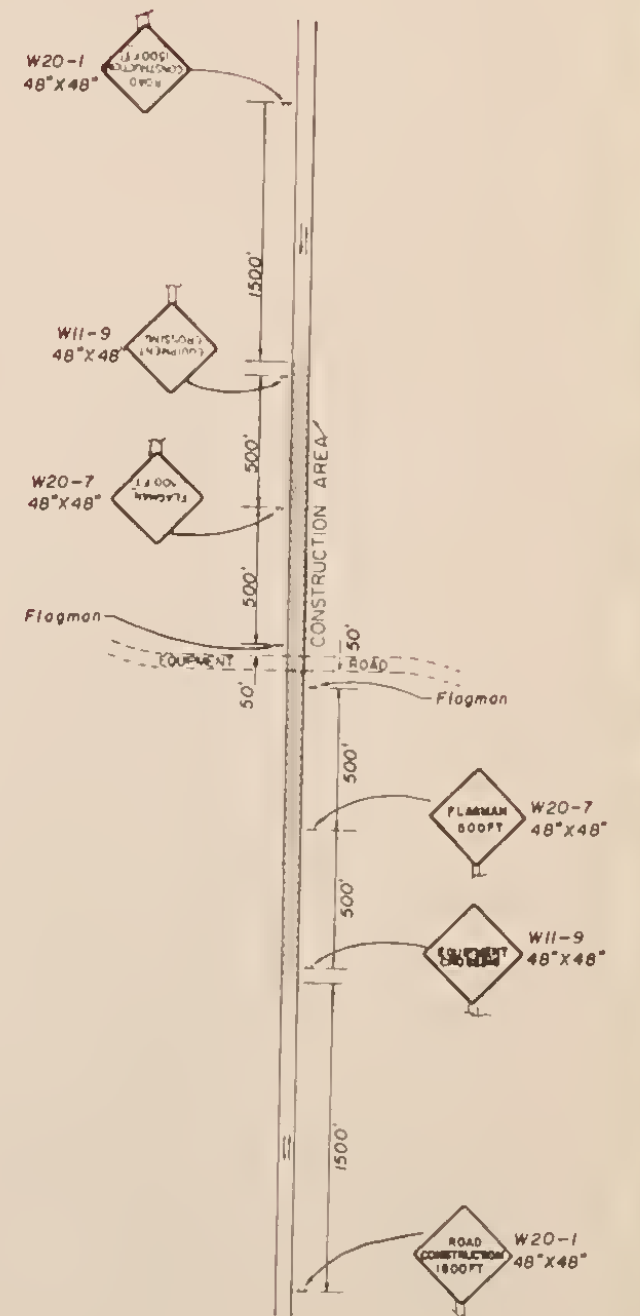
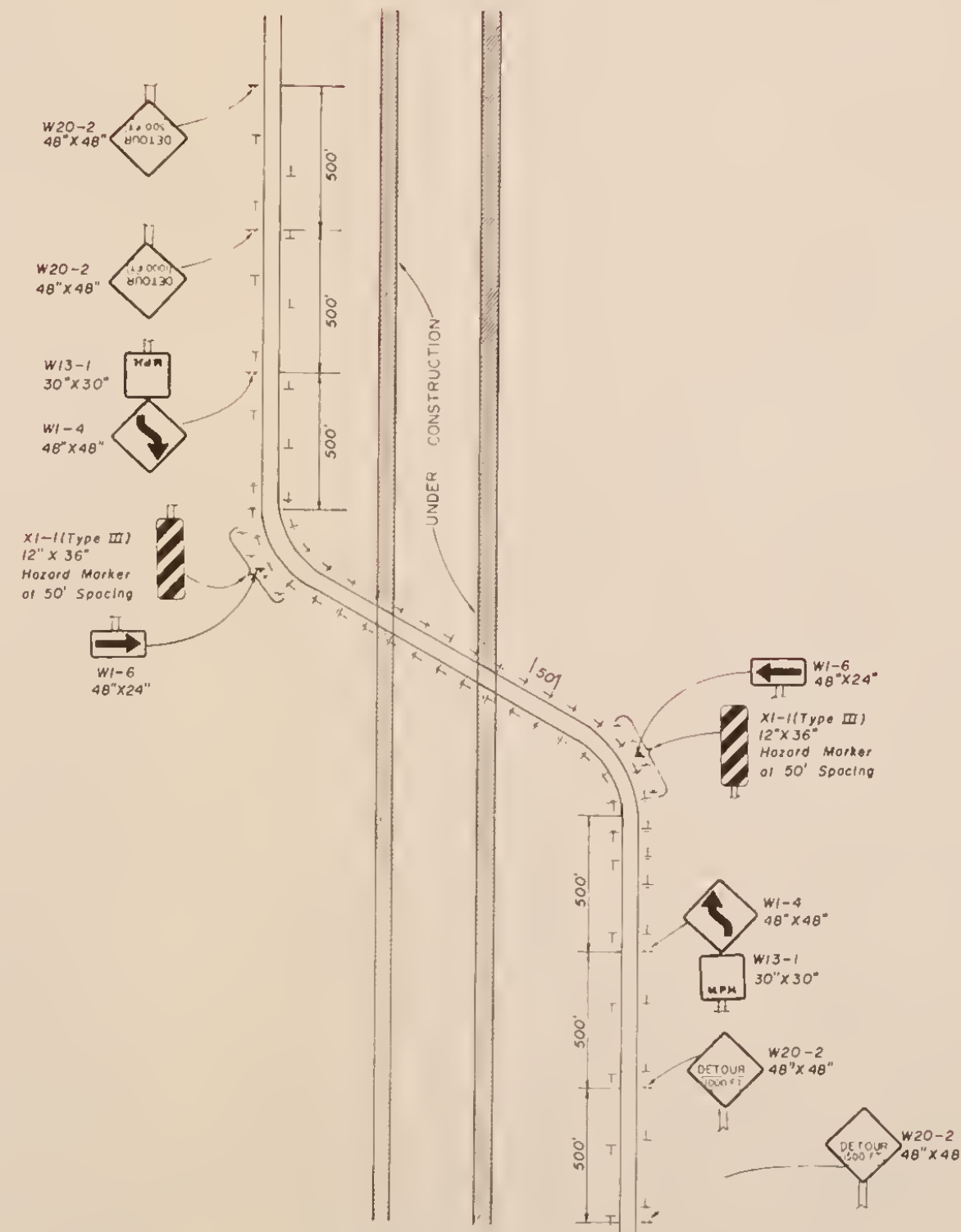
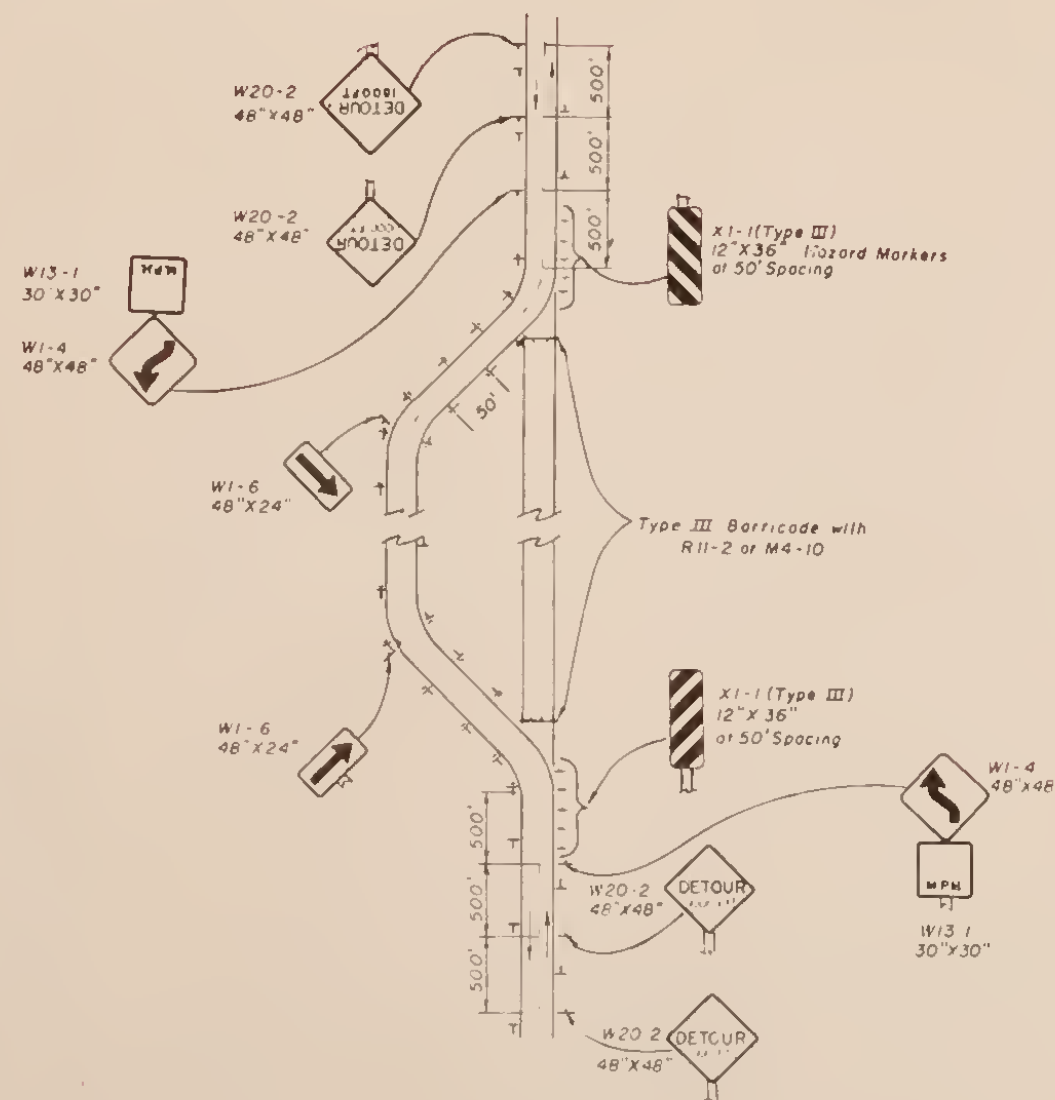
1. NO CONSTRUCTION SHALL COMMENCE ON THE PROJECT UNTIL NECESSARY CONSTRUCTION WARNING SIGNS ARE IN PLACE AND APPROVED BY THE ENGINEER.
2. ALL SIGNS AND BARRICADES REQUIRED FOR A CONSTRUCTION PROJECT (EXCEPT AS NOTED) SHALL BE FURNISHED AND INSTALLED BY THE CONTRACTOR.
3. WHEN SPEED CONTROL APPEARS NECESSARY FOR THE PROTECTION OF THE TRAVELING PUBLIC, SUCH SPEED CONTROL SHALL BE REQUESTED BY THE CONTRACTOR IN WRITING, TO THE ENGINEER.
4. ROUTE MARKERS SHOULD BE USED ON EXCEPTIONALLY LONG PROJECTS THESE WILL BE FURNISHED BY AND REMAIN THE PROPERTY OF THE MONTANA DEPARTMENT OF HIGHWAYS. THE SIGNS SHALL BE INSTALLED BY THE CONTRACTOR AT THE LOCATION DETERMINED BY THE ENGINEER.
5. EXCEPT AS NOTED ON THESE PLANS, ALL SIGNS WILL CONFORM TO THE "MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES FOR STREETS AND HIGHWAYS", LATEST EDITION, PUBLISHED BY THE FEDERAL HIGHWAY ADMINISTRATION.
6. ALL SIGN LOCATIONS ARE APPROXIMATE AND SHOULD BE ADJUSTED TO FIT FIELD CONDITIONS.
7. DETAILED LAYOUTS OF ALL SIGNS WILL BE FURNISHED BY THE TRAFFIC UNIT OF THE MONTANA DEPARTMENT OF HIGHWAYS UPON REQUEST.
8. THE DETERMINATION OF THE APPROPRIATE SIGNING STANDARD TO BE USED FOR A PARTICULAR WORK AREA SHALL BE DETERMINED BY THE ENGINEER.
9. FOR SIGNS LARGER THAN THOSE DETAILED IN FEDERAL HIGHWAY ADMINISTRATION MANUAL, "STANDARD HIGHWAY SIGNS", (1972), AND THE MONTANA DEPARTMENT OF HIGHWAYS, "STANDARD DRAWINGS", THE LEGEND WILL BE INCREASED IN SIZE PROPORTIONATELY.



CONSTRUCTION AREA
BEGINNING AND ENDING SIGNING

STANDARD DRAWING	
REFERENCE:	DWG. NO.
STANDARD SPEC.	203
SECTION NONE	
CONSTRUCTION SIGNING STANDARDS	
APPROVED: <i>[Signature]</i> ANDERSON, DIRECTOR OF HIGHWAYS	
BY: <i>[Signature]</i>	
ADMINISTRATOR - ENGINEERING DIVISION	

REVISED	4/1/73
EFFECTIVE	2/1/72 4/24/73



NOTES

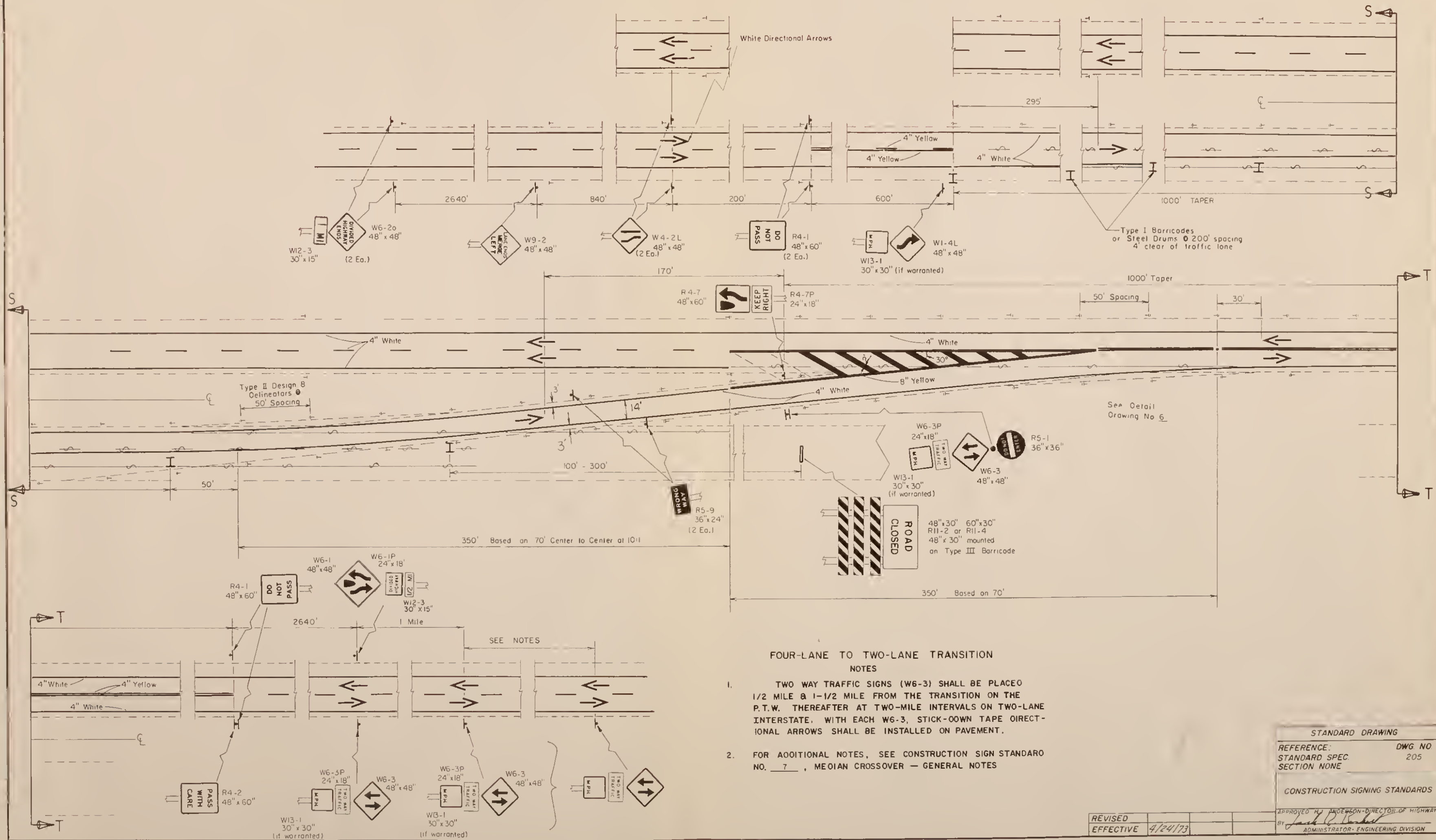
1. USE STANDARD SPACING FOR DELINEATORS ON 2 AND 4 LANE ROADS AS SHOWN IN THE STANDARD SHEETS. CONSTRUCTION TRANSITIONS SHOULD BE MARKED WITH DESIGN "B" DELINEATORS WITH 50' SPACING AS INDICATED.
2. ALL SIGN SPACINGS ARE APPROXIMATE AND SHOULD BE ADJUSTED TO FIT FIELD CONDITIONS.
3. FOR DESIGN DETAILS OF SIGNS, SEE FEDERAL HIGHWAY ADMINISTRATION "STANDARD HIGHWAY SIGNS", 1972 EDITION.
4. EXISTING STRIPING IS TO BE OBLITERATED WHERE IT CONFLICTS WITH TRAFFIC MOVEMENTS ON DETOUR.
5. DETAILED LAYOUTS OF ALL SIGNS WILL BE FURNISHED BY THE TRAFFIC UNIT OF THE MONTANA DEPARTMENT OF HIGHWAYS UPON REQUEST.
6. XI-1 HAZARD MARKERS AT 50' SPACING, BARRICADES AS SHOWN.
7. SEE SPECIAL PROVISIONS FOR REQUIREMENTS FOR PAVEMENT MARKINGS.

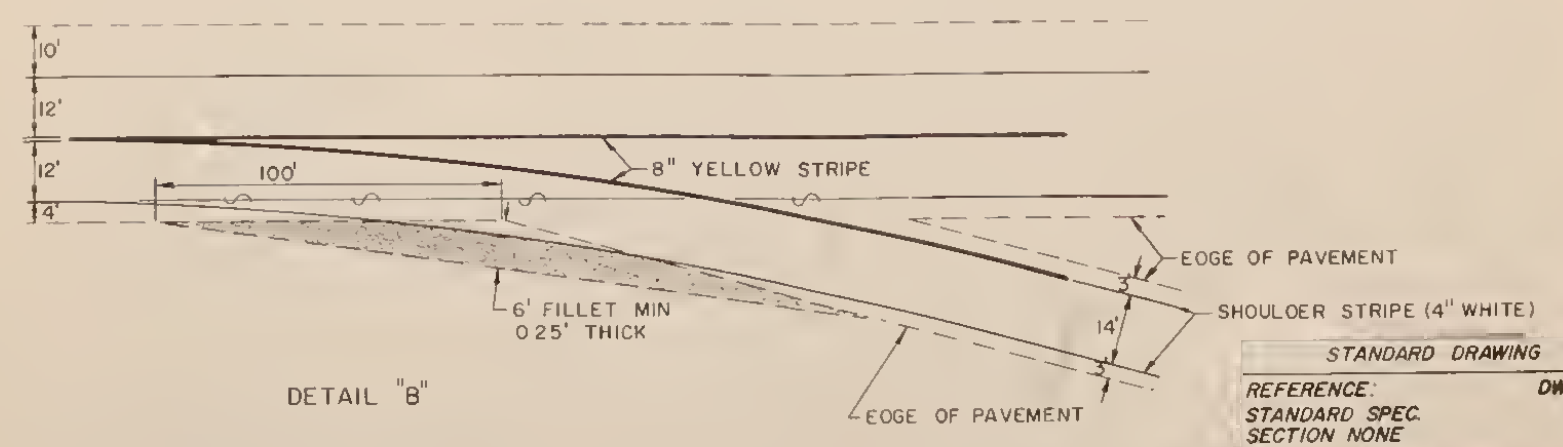
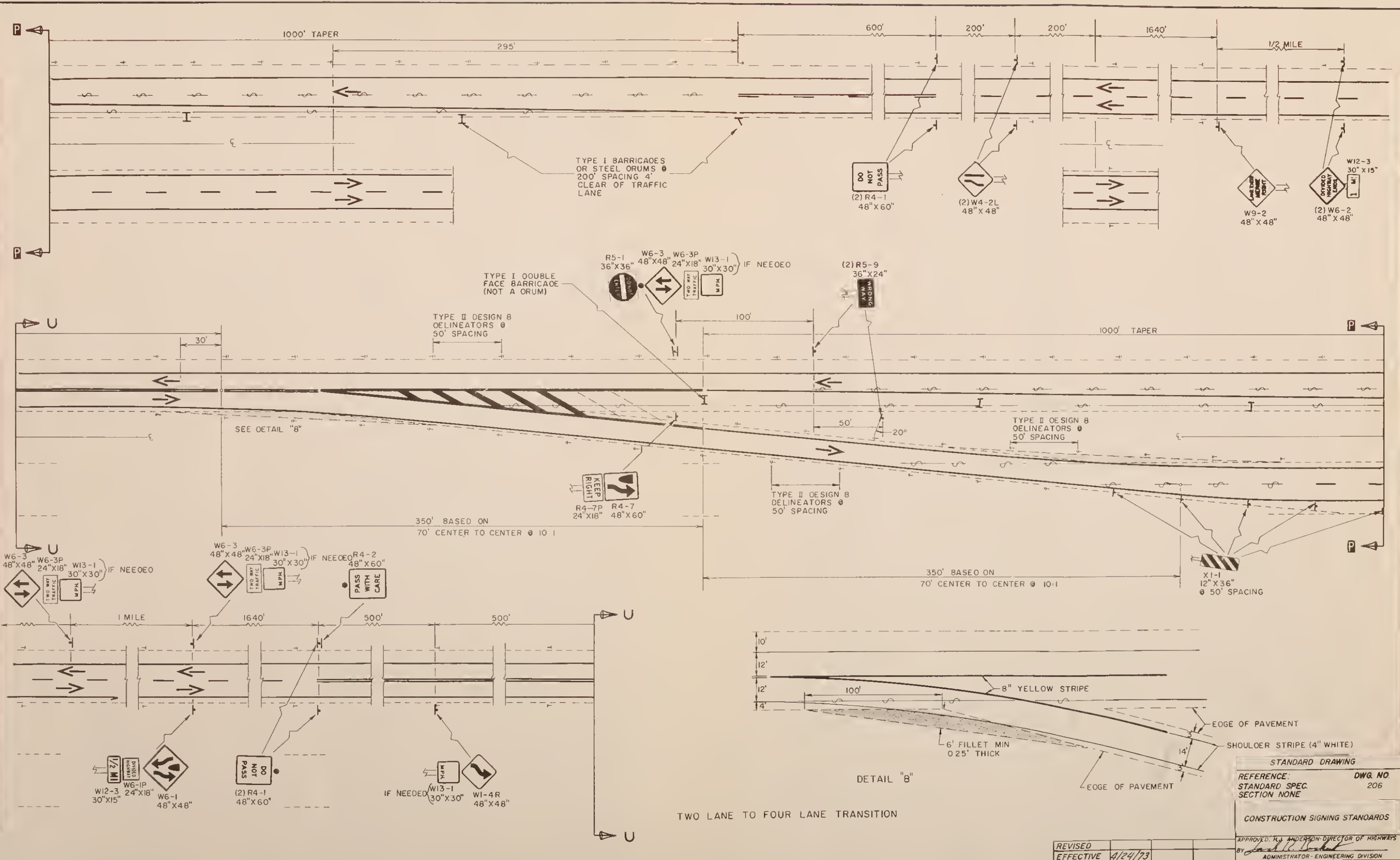
DETOUR AROUND CONSTRUCTION

TWO LANE CROSS-OVER

EQUIPMENT CROSSING IN CONSTRUCTION AREA

STANDARD DRAWING			
REFERENCE :		DWG. NO.	
STANDARD SPEC.		204	
SECTION NONE			
CONSTRUCTION SIGNING STANDARDS			
APPROVED "H" ANDERSON - DIRECTOR OF HIGHWAYS			
BY <u>J. D. B. Baker</u>			
ADMINISTRATOR - ENGINEERING DIVISION			
REVISED		4/1/73	
EFFECTIVE	2/1/72	4/24/73	





STANDARD DRAWING

REFERENCE: STANDARD SPEC. SECTION NONE

DWG. NO. 206

CONSTRUCTION SIGNING STANDARDS

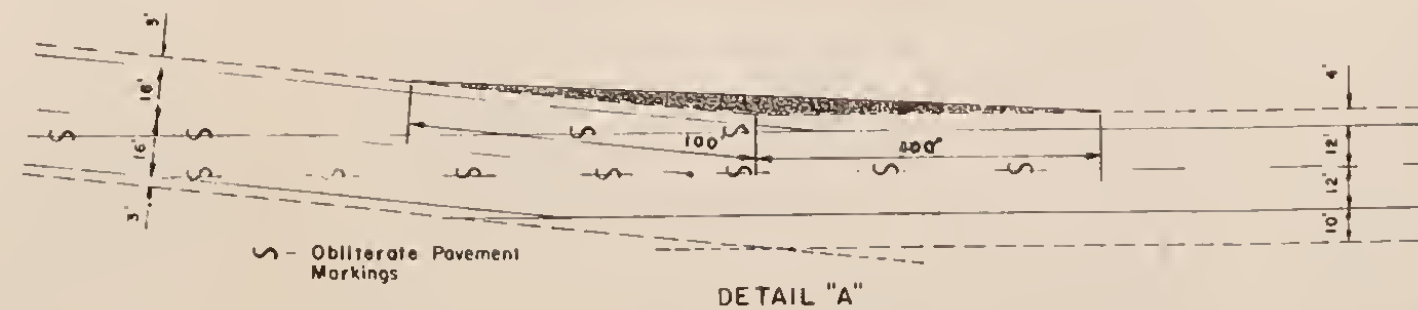
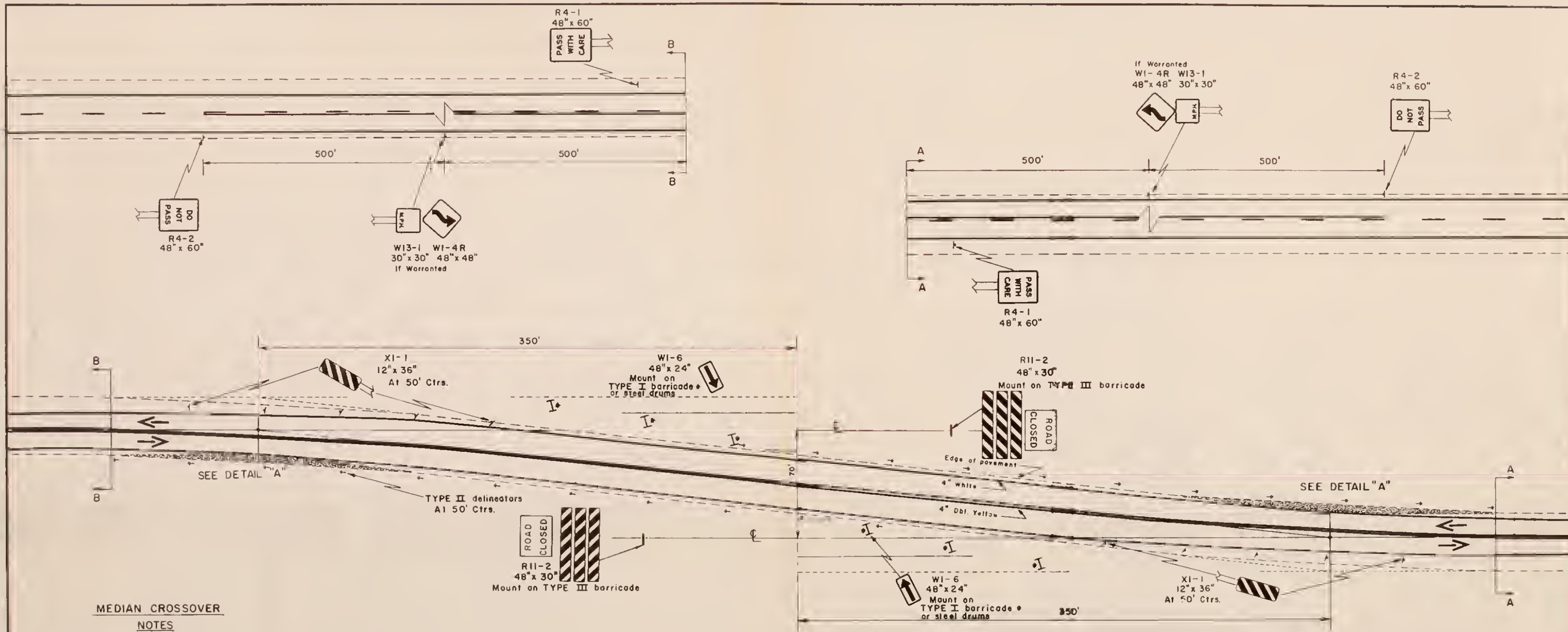
APPROVED: H. J. ANDERSON, DIRECTOR OF HIGHWAYS

BY: *[Signature]*

ADMINISTRATOR - ENGINEERING DIVISION

REVISED

EFFECTIVE 4/24/73

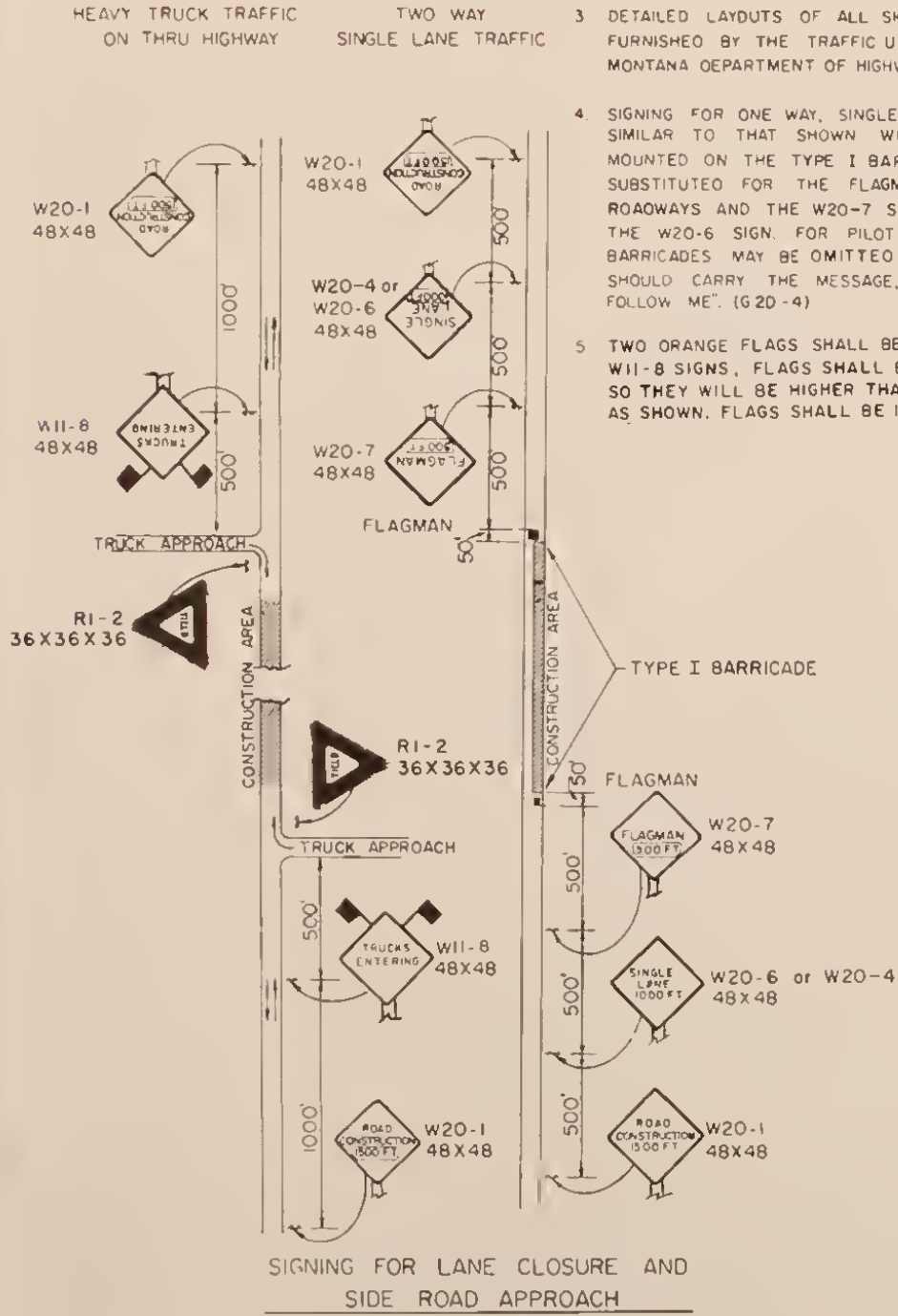


1. TEMPORARY PAVEMENT MARKINGS SHALL BE OF A TYPE TO FACILITATE REMOVAL WHEN NO LONGER NECESSARY. EXISTING PAVEMENT MARKINGS THAT CONFLICT WITH PROPOSED TRAFFIC MOVEMENT ARE TO BE OBLITERATED BY SANDBLASTING, BURNING, PAINTING OR OTHER SUITABLE MEANS.
2. DELINEATORS TO BE SPACED AS SHOWN.
3. FOR SIGN MOUNTING DETAILS SEE CONSTRUCTION SIGNING STANDARD DRAWING NO. 9.
4. DISTANCES FOR SIGN SPACINGS ARE APPROXIMATE ONLY AND ARE MEANT AS A GUIDE FOR UNIFORMITY AND STANDARDIZATION. USE JUDGEMENT AND REASONABLE TOLERANCE FOR SIGN INSTALLATION.
5. CROSSOVER TAPER SHALL BE 1 TO 10 DESIRABLE 1 TO 8 MINIMUM
6. SUGGESTED SUPER OF CURVE TO BE 0.02 FT/FT MINIMUM.

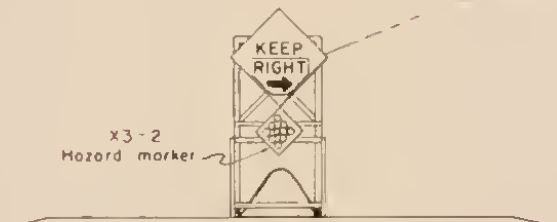
STANDARD DRAWING	
REFERENCE:	DWG. NO.
STANDARD SPEC.	207
SECTION NONE	
CONSTRUCTION SIGNING STANDARDS	
BY <i>[Signature]</i>	
ADMINISTRATOR - ENGINEERING DIVISION	

REVISED
EFFECTIVE 4/24/73

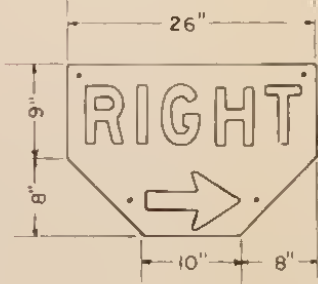
1. ALL SIGN SPACINGS ARE APPROXIMATE AND SHOULD BE ADJUSTED TO FIT FIELD CONDITIONS.
2. FOR DESIGN DETAILS OF SIGNS, SEE FEDERAL HIGHWAY ADMINISTRATION "STANDARD HIGHWAY SIGNS" MANUAL, 1972 EDITION.
3. DETAILED LAYOUTS OF ALL SIGNS WILL BE FURNISHED BY THE TRAFFIC UNIT OF THE MONTANA DEPARTMENT OF HIGHWAYS UPON REQUEST
4. SIGNING FOR ONE WAY, SINGLE LANE TRAFFIC IS SIMILAR TO THAT SHOWN W1-6 ARROW MOUNTED ON THE TYPE I BARRICADES MAY BE SUBSTITUTED FOR THE FLAGMAN FOR ONE WAY ROADWAYS AND THE W20-7 SIGN REPLACED WITH THE W20-6 SIGN. FOR PILOT CAR OPERATION BARRICADES MAY BE OMITTED THE VEHICLE SHOULD CARRY THE MESSAGE, "PILOT CAR FOLLOW ME". (G20-4)
5. TWO ORANGE FLAGS SHALL BE MOUNTED ON ALL W11-8 SIGNS, FLAGS SHALL BE MOUNTED SO THEY WILL BE HIGHER THAN SIGN FACE AS SHOWN. FLAGS SHALL BE 12" X 12" MINIMUM.



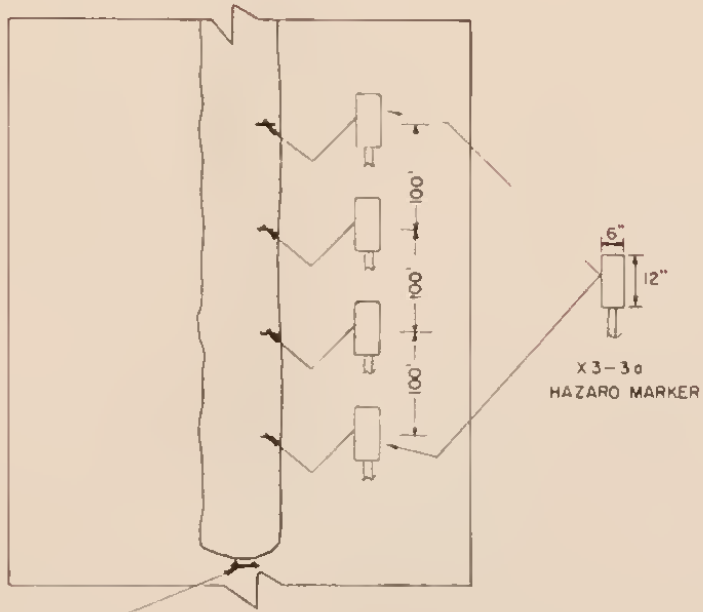
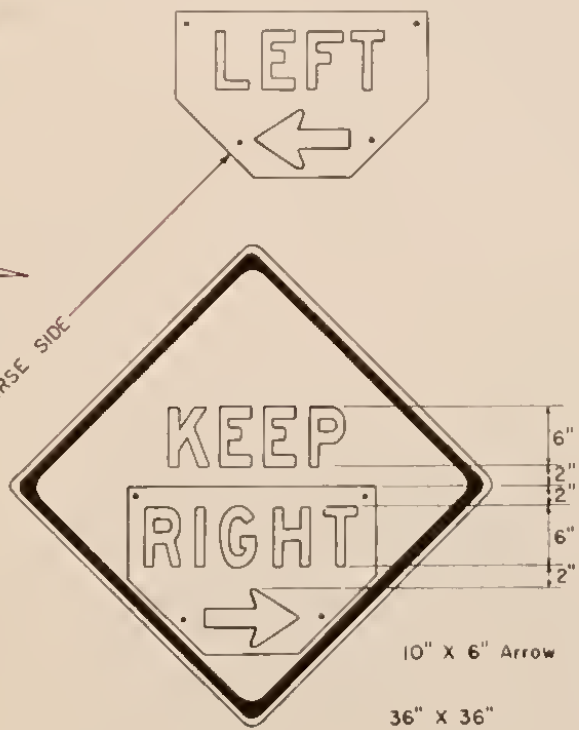
NOTE SEE STANDARD DRAWING NO. 9 FOR TYPICAL PORTABLE SIGN MOUNTING.



NOTE 26" X 17" sheet aluminum plate with black legend on reflectorized orange background. Legend shall conform to FHWA Standard Alphabets. Metal plate shall be attached with 4 metal screws.



REVERSE SIDE



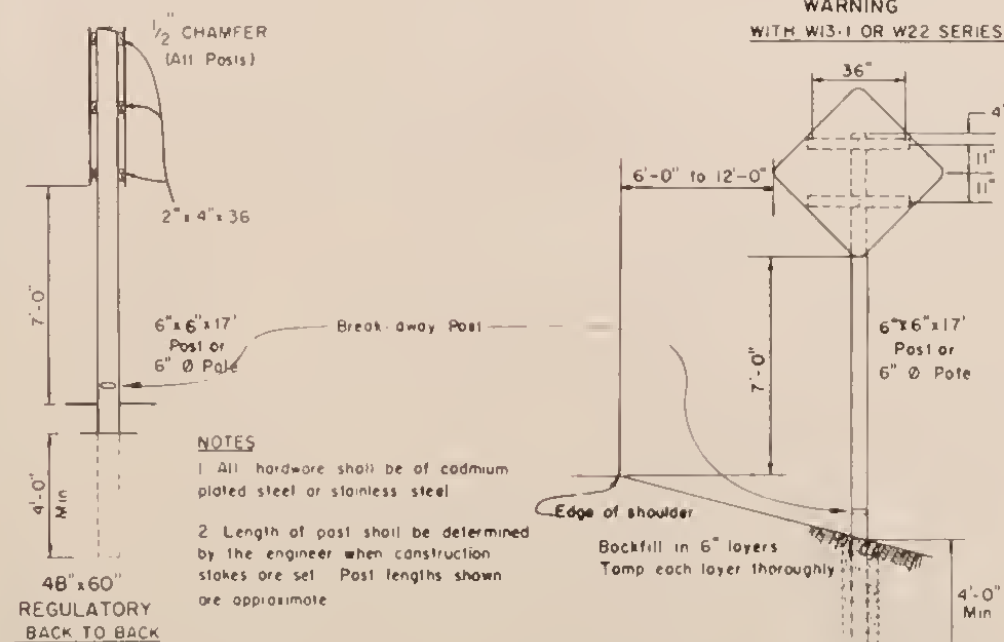
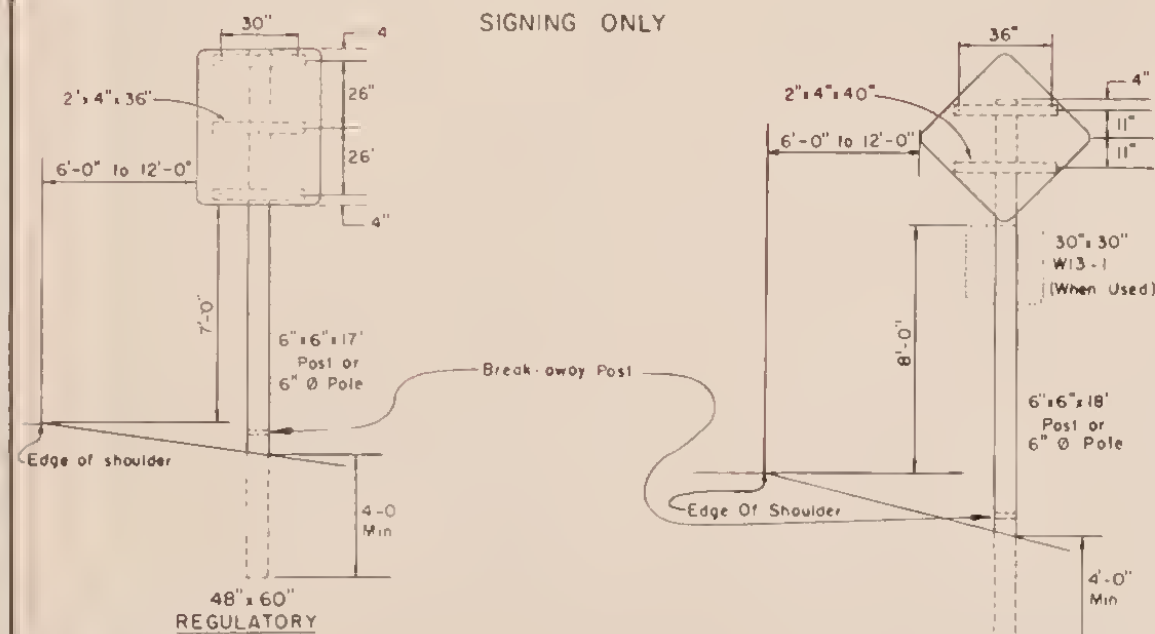
TYPICAL WINDROW SIGNING

The cost of furnishing, placing and handling windrow signs and delineation shall be absorbed in the price bid for various items requiring windrow signing.

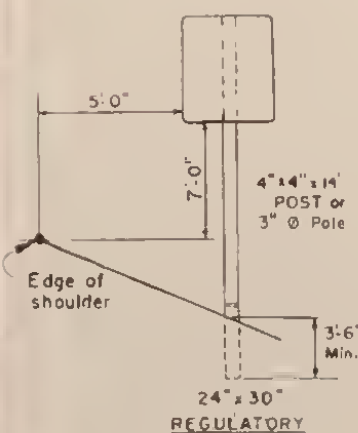
REVISED	4/1/73
EFFECTIVE	2/1/72 4/24/73

STANDARD DRAWING	
REFERENCE:	DWG. NO. 208
STANDARD SPEC.	
SECTION	NONE
CONSTRUCTION SIGNING STANDARDS - SIDE APPROACH, LANE CLOSING AND WINDROW SIGNING	
APPROVED:	J. J. ANDERSON - DIRECTOR OF HIGHWAYS
BY:	L. P. B. - ADMINISTRATOR - ENGINEERING DIVISION

FOR CONSTRUCTION
SIGNING ONLY



NOTES
1 All hardware shall be of cadmium plated steel or stainless steel.
2 Length of post shall be determined by the engineer when construction stakes are set. Post lengths shown are approximate.



TYPICAL SIGN MOUNTING



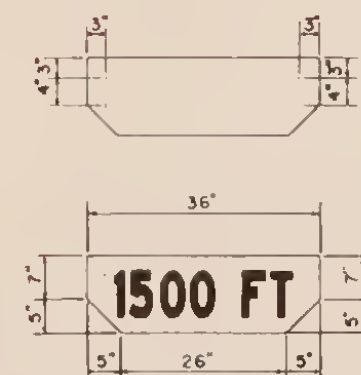
W20-1
4'-0" x 4'-0"

NOTE:

Distance plates may be made for 500ft, 1000ft, and 1500ft and be attached to any of the following signs:

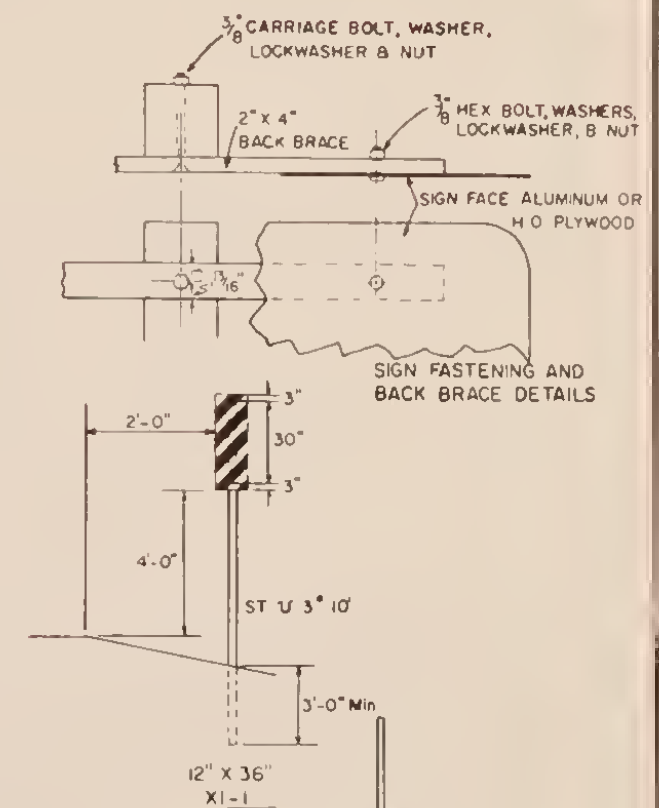
- R11 - 2 ROAD CLOSED
- W20 - 4 ONE LANE ROAD
- W20 - 6 SINGLE LANE
- W20 - 7 FLAGMAN

36"x12" metal plate to be fastened on with 4 metal screws



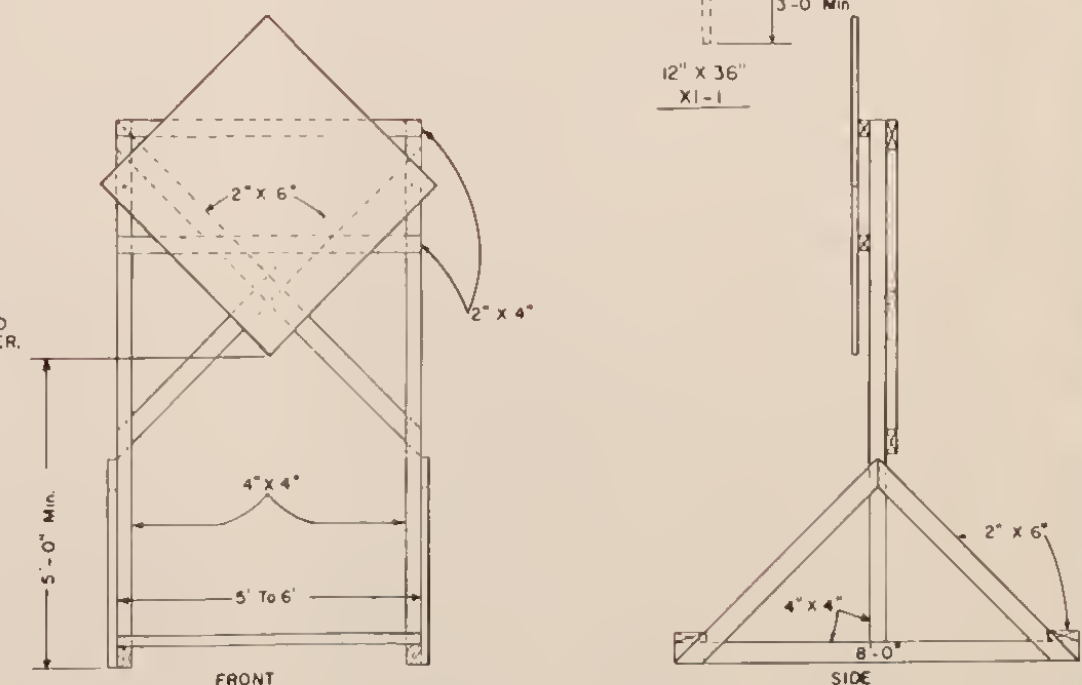
36"x12" Steel alum plate with black legend on reflectorized orange background. See FHWA 'Standard Highway Signs' manual for details of distance legends and construction signs.

FOR CONSTRUCTION SIGNING
ONLY



NOTE:

STRUCTURAL DESIGN FOR PORTABLE SIGN MOUNTING ARE SUGGESTED ONLY. ALTERNATE SUPPORT DESIGN MAY BE APPROVED BY THE PROJECT MANAGER.



TYPICAL PORTABLE SIGN MOUNTING

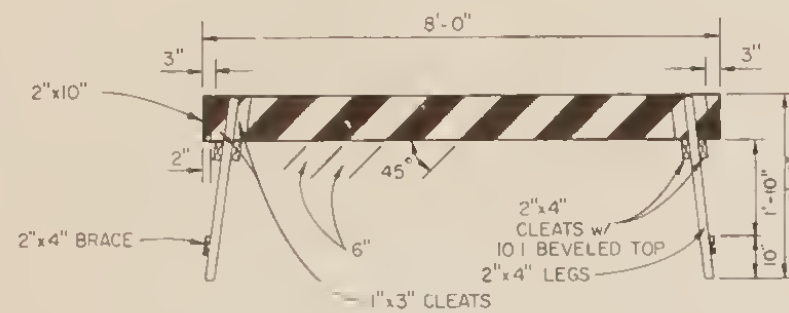
TYPICAL SIGN MOUNTING

CONSTRUCTION SIGN DETAILS

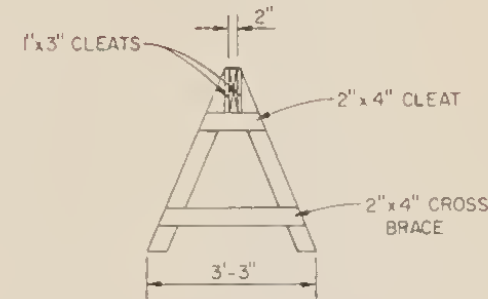
STANDARD DRAWING	
REFERENCE	DWG NO
STANDARD SPEC.	209
SECTION NONE	
CONSTRUCTION SIGNING STANDARDS - ERECTION AND SIGN DETAILS	
APPROVED: H. J. ANDERSON - DIRECTOR OF HIGHWAYS	
BY: [Signature] ADMINISTRATOR - ENGINEERING DIVISION	

REVISED	4/1/73
EFFECTIVE	2/1/72 4/24/73

TYPE I BARRICADE

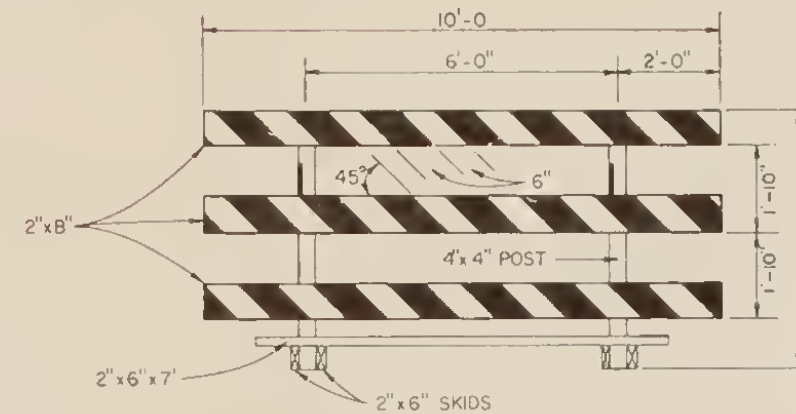


FRONT VIEW

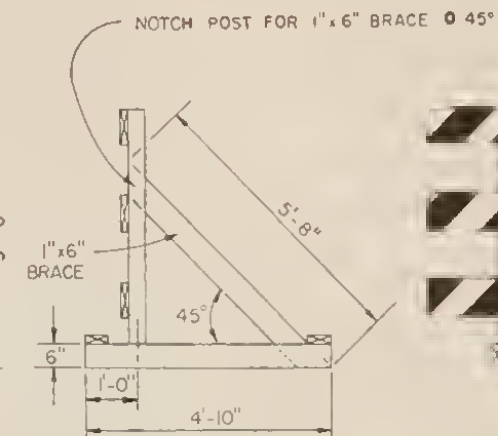


END VIEW

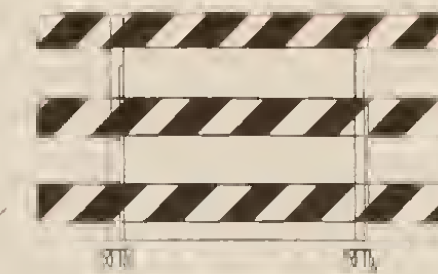
TYPE III BARRICADE



FRONT VIEW

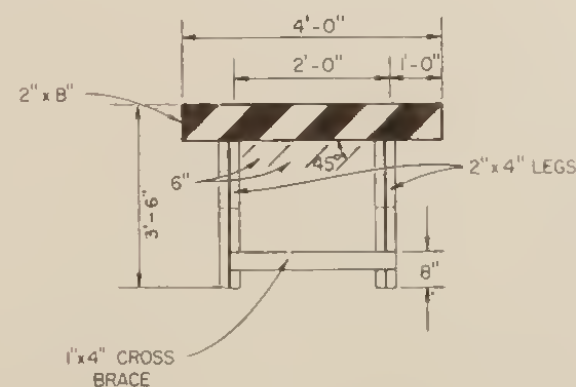


END VIEW

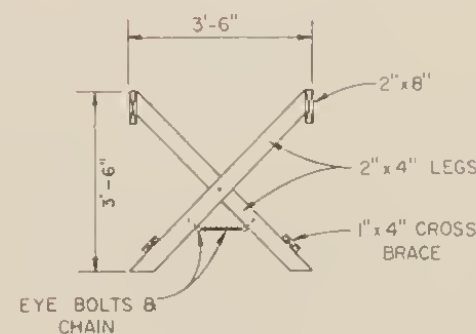


REAR VIEW

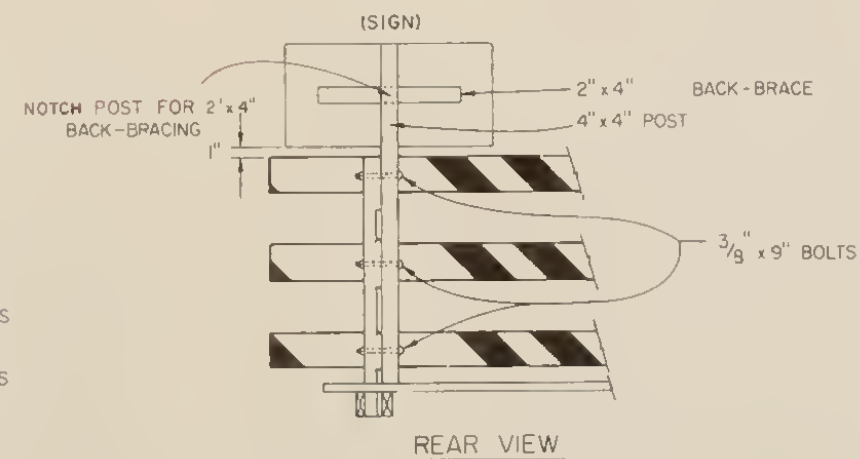
TYPE II BARRICADE



FRONT VIEW

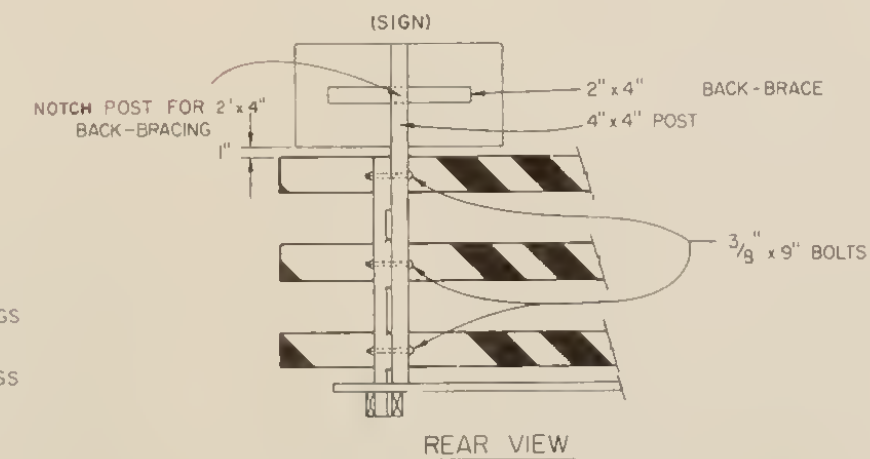


END VIEW



REAR VIEW

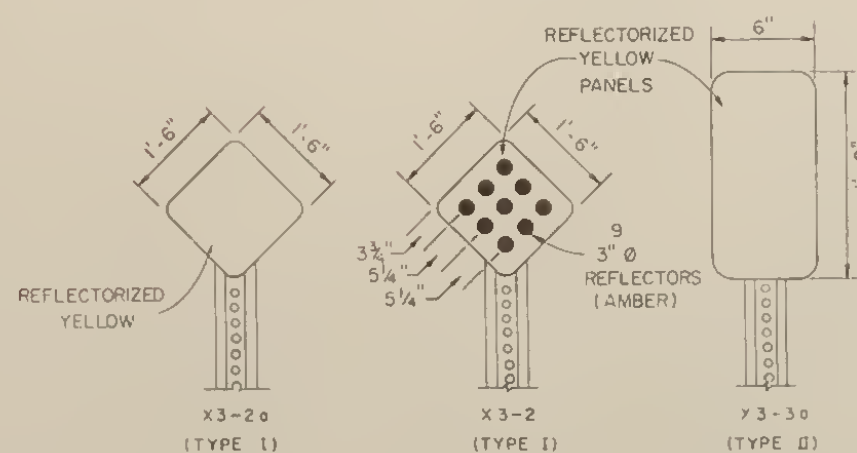
SIGN MOUNTING



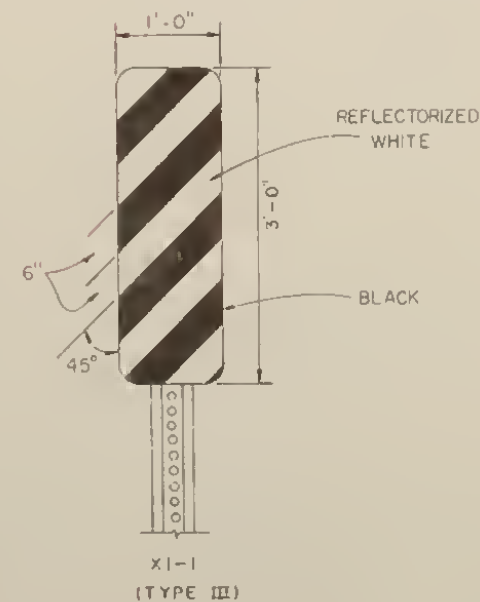
NOTES.

BARRICADES

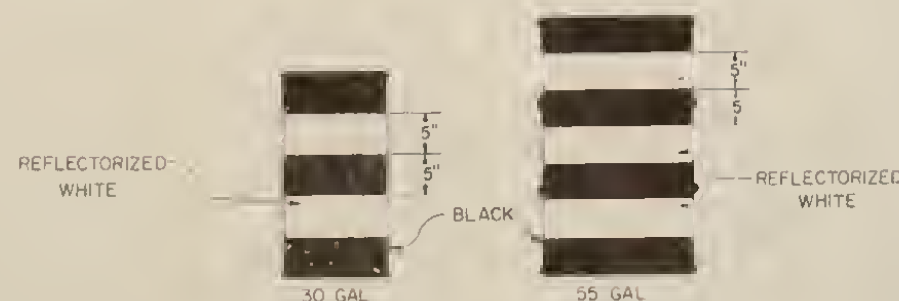
- ALL BARRICADES SHALL HAVE ALTERNATING BLACK AND REFLECTIVE WHITE STRIPES, 6" IN WIDTH AT AN ANGLE OF 45° AS SHOWN. THE STRIPES SHALL SLOPE DOWNWARD TOWARD THE SIDE TRAFFIC IS TO PASS, BOTH FRONT AND BACK. THE COLOR ORANGE SHALL NOT BE USED ON BARRICADES.
- ALL BARRICADES SHALL BE REFLECTORIZED WITH SILVER SHEETING MOUNTED ON A SHEET ALUMINUM BACKING AT LEAST 0.019" THICK ALUMINUM ALLOY 6061-T6 CONFORMING TO A.S.T.M. DESIGNATION B-209 SHALL BE USED. THIS REFLECTIVE ALUMINUM SHEETING SHALL BE SECURED WITH ALUMINUM NAILS.
- BARRICADES, INCLUDING FRAMEWORK, SHALL BE PAINTED WITH 2 COATS OF BLACK PAINT ACCORDING TO SECTION M-280.02, (2 B 9) STANDARD SPECIFICATIONS, OCT. 1970.
- SANDBAGS OF SUFFICIENT WEIGHT SHALL BE USED TO HOLD BARRICADE IN PLACE.
- BARRICADES SHALL BE CONSTRUCTED OF STANDARD GRADE (NO. 2) OR BETTER S4S LUMBER. USE 3/8" CARRIAGE BOLTS FOR ALL CONNECTIONS.



HAZARD MARKERS

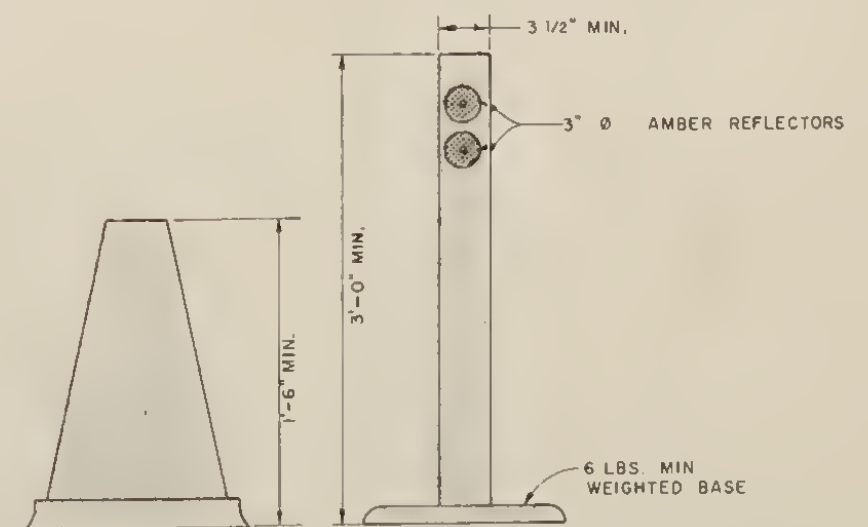


X1-1
(TYPE III)



DRUMS

- PAINTED AS SHOWN, AND ACCORDING TO SECTION M-280.02, STANDARD SPECIFICATIONS, 1970.
- FILL, NOT TO EXCEED 1/4 OF DRUM, WITH SAND TO HOLD DRUM UPRIGHT AND IN PLACE.



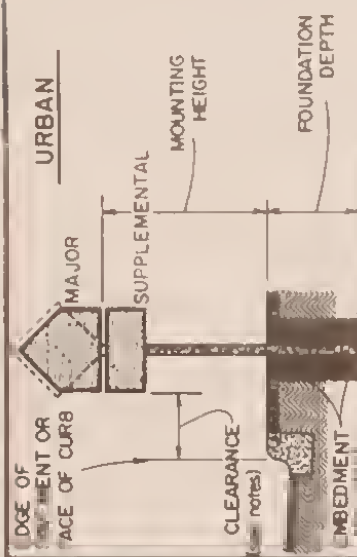
CONES FLEXIBLE GUIDE POST

FLUORESCENT ORANGE
STANDARD DESIGN

FLUORESCENT ORANGE
AS APPROVED BY
PROJECT MANAGER

REVISED	EFFECTIVE	DATE
2/1/72	4/24/73	

STANDARD DRAWING	
REFERENCE:	DWG NO.
STANDARD SPEC.	210
SECTION NONE	
CONSTRUCTION SIGNING STANDARDS-BARRICADES	
APPROVED: H. ANDERSON-DIRECTOR OF HIGHWAYS	
BY: [Signature]	
ADMINISTRATOR-ENGINEERING DIVISION	



TYPICAL

PRIMARY & SECONDARY HIGHWAYS

28 LBS/SQ.FT.

PANEL SIZE (Each)		SQ. FT. (Each)	POST INFORMATION		MOUNTING		FOUNDATION		REMARKS
REGULATORY		SERIES	URBAN	RURAL	UR8AN	RURAL	UR8AN	DEPTH	
REGULATORY	30" x 30"	5.2							
	30" x 30" WITH 12" x 6"	5.2+5	2" Ø PIPE	3" Ø POLE	7'-0"	5'-0"	3'-0"	3'-0"	MAJOR PANEL ONLY
	36" x 36"	7.5	2" Ø PIPE	3" Ø POLE	7'-0"	5'-0"	3'-0"	3'-0"	MAJOR PANEL WITH SUPPLEMENTAL PANEL
	36" x 36" WITH 12" x 6"	7.5+5	2 1/2" Ø PIPE	4" Ø POLE	7'-0"	5'-0"	3'-0"	3'-0"	MAJOR PANEL ONLY
	48" x 48"	13.3	2 1/2" Ø PIPE	4" Ø POLE	7'-0"	5'-0"	3'-0"	3'-0"	MAJOR PANEL WITH SUPPLEMENTAL PANEL
	24" x 30"	5.0	2" Ø PIPE	3" Ø POLE	7'-0"	5'-0"	3'-0"	3'-0"	MAJOR PANEL ONLY
	24" x 30" WITH 13" x 13"	5.0+1.2	2 1/2" Ø PIPE	3" Ø POLE	7'-0"	5'-0"	3'-0"	3'-0"	MAJOR PANEL WITH SUPPLEMENTAL PANEL
	36" x 60"	20.0	3 1/2" Ø PIPE	5" Ø POLE	7'-0"	5'-0"	3'-0"	3'-0"	MAJOR PANEL ONLY
	48" x 60" WITH 24" x 18"	20.0+3.0	4" Ø PIPE	6" Ø POLE	7'-6"	5'-6"	3'-6"	3'-6"	MAJOR PANEL WITH SUPPLEMENTAL PANEL
	24" x 24"	4.0	2" Ø PIPE	3" Ø POLE	7'-0"	5'-0"	3'-0"	3'-0"	MAJOR PANEL ONLY
WARNING	24" x 24" WITH 24" x 18"	4.0+3.0	2 1/2" Ø PIPE	3" Ø POLE	7'-6"	5'-6"	3'-0"	3'-0"	MAJOR PANEL WITH SUPPLEMENTAL PANEL
	36" x 36"	9.0	2 1/2" Ø PIPE	4" Ø POLE	7'-0"	5'-0"	3'-0"	3'-0"	MAJOR PANEL ONLY
	36" x 36" WITH 24" x 18"	9.0+3.0	3" Ø PIPE	4" Ø POLE	7'-6"	5'-6"	3'-0"	3'-0"	MAJOR PANEL WITH SUPPLEMENTAL PANEL
	30" x 30"	6.3	3" Ø PIPE	3" Ø POLE	7'-0"	5'-0"	3'-0"	3'-0"	MAJOR PANEL ONLY
	36" x 48"	12.0	3" Ø PIPE	5" Ø POLE	7'-0"	5'-0"	3'-0"	3'-0"	MAJOR PANEL ONLY
	24" x 12"	2.0	2" Ø PIPE	3" Ø POLE	7'-0"	5'-0"	3'-0"	3'-0"	MAJOR PANEL ONLY
	36" x 24"	6.0	2 1/2" Ø PIPE	3" Ø POLE	7'-0"	5'-0"	3'-0"	3'-0"	MAJOR PANEL ONLY
	30" x 36"	7.5	2 1/2" Ø PIPE	3" Ø POLE	7'-0"	5'-0"	3'-0"	3'-0"	MAJOR PANEL ONLY
	30" x 18"	3.8	2" Ø PIPE	3" Ø POLE	7'-0"	5'-0"	3'-0"	3'-0"	MAJOR PANEL ONLY
	36" x 12"	3.0	2" Ø PIPE	3" Ø POLE	7'-0"	5'-0"	3'-0"	3'-0"	MAJOR PANEL ONLY
WARNING	16" x 24"	3.0	2" Ø PIPE	3" Ø POLE	7'-0"	5'-0"	3'-0"	3'-0"	MAJOR PANEL ONLY
	12" x 18"	1.5	2" Ø PIPE	3" Ø POLE	7'-0"	5'-0"	3'-0"	3'-0"	MAJOR PANEL ONLY
	12" x 6"	.5	2" Ø PIPE	3" Ø POLE	7'-0"	5'-0"	3'-0"	3'-0"	MAJOR PANEL ONLY
	36" x 36" x 36"	3.9	2" Ø PIPE	3" Ø POLE	7'-0"	5'-0"	3'-0"	3'-0"	MAJOR PANEL ONLY
	48" x 48" x 48"	6.6	2 1/2" Ø PIPE	3" Ø POLE	7'-0"	5'-0"	3'-0"	3'-0"	MAJOR PANEL ONLY
	WARNING SERIES								
	30" x 30"	6.3	2 1/2" Ø PIPE	3" Ø POLE	7'-0"	5'-0"	3'-0"	3'-0"	MAJOR PANEL ONLY
	30" x 30" WITH 18" x 18"	6.3+2.3	2 1/2" Ø PIPE	4" Ø POLE	7'-6"	5'-6"	3'-0"	3'-0"	MAJOR PANEL WITH SUPPLEMENTAL PANEL
	30" x 30" WITH 24" x 24"	6.3+4.0	2 1/2" Ø PIPE	4" Ø POLE	7'-0"	5'-0"	3'-0"	3'-0"	MAJOR PANEL WITH SUPPLEMENTAL PANEL
	30" x 30" WITH 24" x 18"	6.3+3.0	2 1/2" Ø PIPE	4" Ø POLE	7'-6"	5'-6"	3'-0"	3'-0"	MAJOR PANEL WITH SUPPLEMENTAL PANEL
SCHOOL XING	36" x 36"	9.0	2 1/2" Ø PIPE	4" Ø POLE	7'-0"	5'-0"	3'-0"	3'-0"	MAJOR PANEL ONLY
	36" x 36" WITH 18" x 18"	9.0+2.3	3" Ø PIPE	4" Ø POLE	7'-6"	5'-6"	3'-0"	3'-0"	MAJOR PANEL WITH SUPPLEMENTAL PANEL
	36" x 36" WITH 24" x 24"	9.0+4.0	3" Ø PIPE	4" Ø POLE	8'-0"	6'-0"	3'-0"	3'-0"	MAJOR PANEL WITH SUPPLEMENTAL PANEL
	36" x 36" WITH 24" x 18"	9.0+3.0	3" Ø PIPE	4" Ø POLE	7'-6"	5'-6"	3'-0"	3'-0"	MAJOR PANEL WITH SUPPLEMENTAL PANEL
	48" x 48"	16.0	3 1/2" Ø PIPE	5" Ø POLE	7'-0"	5'-0"	3'-0"	3'-0"	MAJOR PANEL ONLY
	48" x 48" WITH 18" x 18"	16.0+2.3	3 1/2" Ø PIPE	5" Ø POLE	7'-6"	5'-6"	3'-0"	3'-0"	MAJOR PANEL WITH SUPPLEMENTAL PANEL
	48" x 48" WITH 24" x 24"	16.0+4.0	3 1/2" Ø PIPE	5" Ø POLE	8'-0"	6'-0"	3'-0"	3'-0"	MAJOR PANEL WITH SUPPLEMENTAL PANEL
	48" x 48" WITH 24" x 18"	16.0+3.0	3 1/2" Ø PIPE	5" Ø POLE	7'-6"	5'-6"	3'-0"	3'-0"	MAJOR PANEL WITH SUPPLEMENTAL PANEL
	48" x 24"	8.0	(2) 2" Ø PIPE	3" Ø POLE	7'-0"	5'-0"	3'-0"	3'-0"	MAJOR PANEL ONLY
	48" x 60"	20.0	3 1/2" Ø PIPE	5" Ø POLE	7'-0"	5'-0"	3'-0"	3'-0"	MAJOR PANEL ONLY
SCHOOL XING	4" DIA.	7.0	2 1/2" Ø PIPE	3" Ø POLE	7'-0"	5'-0"	3'-0"	3'-0"	MAJOR PANEL ONLY
	36" x 48" x 48"	5.5	2 1/2" Ø PIPE	3" Ø POLE	7'-0"	5'-0"	3'-0"	3'-0"	MAJOR PANEL ONLY
	SCHOOL XING SERIES								
	36" x 36"	6.8	2 1/2" Ø PIPE	3" Ø POLE	7'-0"	5'-0"	3'-0"	3'-0"	MAJOR PANEL ONLY
	36" x 36" WITH 36" x 12"	6.8+3.0	2 1/2" Ø PIPE	4" Ø POLE	7'-0"	5'-0"	3'-0"	3'-0"	MAJOR PANEL WITH SUPPLEMENTAL PANEL
	36" x 36" WITH 36" x 18"	6.8+4.5	3" Ø PIPE	4" Ø POLE	7'-6"	5'-6"	3'-0"	3'-0"	MAJOR PANEL WITH SUPPLEMENTAL PANEL
	48" x 48"	12.0	3" Ø PIPE	4" Ø POLE	7'-0"	5'-0"	3'-0"	3'-0"	MAJOR PANEL ONLY
	48" x 48" WITH 36" x 12"	12.0+3.0	3" Ø PIPE	5" Ø POLE	7'-0"	5'-0"	3'-0"	3'-0"	MAJOR PANEL WITH SUPPLEMENTAL PANEL
	48" x 48" WITH 36" x 18"	12.0+4.5	3 1/2" Ø PIPE	5" Ø POLE	7'-6"	5'-6"	3'-0"	3'-0"	MAJOR PANEL WITH SUPPLEMENTAL PANEL

NOTES

- 1 Information contained herein is based on 28Lbs./Sq.Ft. per the Wind Design Specifications for the Department of Highways.
- 2 Post Information shown above is figured for a Major Panel mounted by itself,
- 3 and/or a Major Panel mounted with a Supplemental Panel below.
- 4 The Mounting Heights shown above are figured at :
 - a) 5 feet in Rural conditions, measured from the bottom of the Major Panel, when used alone, to the near edge of the pavement ;
 - b) 7 feet in Urban (and Municipal) conditions, measured from the bottom of the Major Panel, when used alone, to the near top of the ground or pavement ; (see sketches above, top)
 - c) and 1 foot less than the above , measured from the bottom of the Supplemental Panel , when used below a Major Panel.
- 5 For Clearance, see Signing Standard Drawing No. 215 .
- 6 For Embedments, see Signing Standard Drawing No. 224 B 228

APPROVED: H. J. ANDERSON - DIRECTOR OF
HIGHWAYS
BY: Jack D. B. [Signature]
ADMINISTRATOR - ENGINEERING DIVISION

SIGNING
STANDARD DRAWING NO. 211

STATE OF MONTANA
DEPARTMENT OF HIGHWAYS
TYPICAL ERECTION
SPECIFICATION STANDARDS

28 LBS/SQ.FT.

RURAL			TYPICAL			URBAN		
			ERECTION SPECIFICATION STANDARDS					
DRAWN BY: 8-1-73 G. E. G.			PRIMARY & SECONDARY HIGHWAYS			32 LBS/SQ.FT		
CHECKED BY: 8-8-73 C. H. L.								
PANEL SIZE (Each)	SQ. FT. (Each)	POST INFORMATION		MOUNTING HEIGHT		FOUNDATION DEPTH		REMARKS
REGULATORY SERIES		URBAN	RURAL	URBAN	RURAL	URBAN	RURAL	
30" x 30"	5.2	2 1/2" Ø PIPE	3" Ø POLE	7'-0"	5'-0"	3'-0"	3'-0"	MAJOR PANEL ONLY
30" x 30" WITH 12" x 6"	5.2+5	2 1/2" Ø PIPE	3" Ø POLE	7'-0"	5'-0"	3'-0"	3'-0"	MAJOR PANEL WITH SUPPLEMENTAL PANEL
36" x 36"	7.5	2 1/2" Ø PIPE	4" Ø POLE	7'-0"	5'-0"	3'-0"	3'-0"	MAJOR PANEL ONLY
36" x 36" WITH 12" x 6"	7.5+5	2 1/2" Ø PIPE	4" Ø POLE	7'-0"	5'-0"	3'-0"	3'-0"	MAJOR PANEL WITH SUPPLEMENTAL PANEL
48" x 48"	13.3	3" Ø PIPE	5" Ø POLE	7'-0"	5'-0"	3'-0"	3'-0"	MAJOR PANEL ONLY
24" x 30"	5.0	2 1/2" Ø PIPE	3" Ø POLE	7'-0"	5'-0"	3'-0"	3'-0"	MAJOR PANEL ONLY
48" x 48" WITH 13" x 13"	13.3+1.2	2 1/2" Ø PIPE	3" Ø POLE	7'-0"	5'-0"	3'-0"	3'-0"	MAJOR PANEL WITH SUPPLEMENTAL PANEL
48" x 60"	20.0	4" Ø PIPE	5" Ø POLE	7'-0"	5'-0"	3'-6"	3'-0"	MAJOR PANEL ONLY
48" x 60" WITH 24" x 18"	20.0+3.0	4" Ø PIPE	6" Ø POLE	7'-6"	5'-6"	3'-6"	3'-6"	MAJOR PANEL WITH SUPPLEMENTAL PANEL
24" x 24"	4.0	2" Ø PIPE	3" Ø POLE	7'-0"	5'-0"	3'-0"	3'-0"	MAJOR PANEL ONLY
36" x 36"	9.0	2 1/2" Ø PIPE	4" Ø POLE	7'-0"	5'-0"	3'-0"	3'-0"	MAJOR PANEL ONLY
36" x 36" WITH 24" x 18"	9.0+3.0	3" Ø PIPE	5" Ø POLE	7'-6"	5'-6"	3'-0"	3'-0"	MAJOR PANEL WITH SUPPLEMENTAL PANEL
30" x 30"	6.3	2 1/2" Ø PIPE	3" Ø POLE	7'-0"	5'-0"	3'-0"	3'-0"	MAJOR PANEL ONLY
36" x 48"	12.0	3" Ø PIPE	5" Ø POLE	7'-0"	5'-0"	3'-0"	3'-0"	MAJOR PANEL ONLY
24" x 12"	2.0	2" Ø PIPE	3" Ø POLE	7'-0"	5'-0"	3'-0"	3'-0"	MAJOR PANEL ONLY
36" x 24"	6.0	2 1/2" Ø PIPE	3" Ø POLE	7'-0"	5'-0"	3'-0"	3'-0"	MAJOR PANEL ONLY
30" x 36"	7.5	2 1/2" Ø PIPE	4" Ø POLE	7'-0"	5'-0"	3'-0"	3'-0"	MAJOR PANEL ONLY
30" x 18"	3.8	2" Ø PIPE	3" Ø POLE	7'-0"	5'-0"	3'-0"	3'-0"	MAJOR PANEL ONLY
36" x 12"	3.0	2" Ø PIPE	3" Ø POLE	7'-0"	5'-0"	3'-0"	3'-0"	MAJOR PANEL ONLY
18" x 24"	3.0	2" Ø PIPE	3" Ø POLE	7'-0"	5'-0"	3'-0"	3'-0"	MAJOR PANEL ONLY
12" x 18"	1.5	2" Ø PIPE	3" Ø POLE	7'-0"	5'-0"	3'-0"	3'-0"	MAJOR PANEL ONLY
12" x 6"	.5	2" Ø PIPE	3" Ø POLE	7'-0"	5'-0"	3'-0"	3'-0"	MAJOR PANEL ONLY
36" x 36" x 36"	3.9	2" Ø PIPE	3" Ø POLE	7'-0"	5'-0"	3'-0"	3'-0"	MAJOR PANEL ONLY
48" x 48" x 48"	6.6	2 1/2" Ø PIPE	4" Ø POLE	7'-0"	5'-0"	3'-0"	3'-0"	MAJOR PANEL ONLY
WARNING SERIES								
30" x 30"	6.3	2 1/2" Ø PIPE	3" Ø POLE	7'-0"	5'-0"	3'-0"	3'-0"	MAJOR PANEL ONLY
30" x 30" WITH 18" x 18"	6.3+2.3	2 1/2" Ø PIPE	4" Ø POLE	7'-6"	5'-6"	3'-0"	3'-0"	MAJOR PANEL WITH SUPPLEMENTAL PANEL
30" x 30" WITH 24" x 24"	6.3+4.0	3" Ø PIPE	4" Ø POLE	7'-0"	5'-0"	3'-0"	3'-0"	MAJOR PANEL WITH SUPPLEMENTAL PANEL
30" x 30" WITH 24" x 18"	6.3+3.0	3" Ø PIPE	4" Ø POLE	7'-6"	5'-6"	3'-0"	3'-0"	MAJOR PANEL WITH SUPPLEMENTAL PANEL
36" x 36"	9.0	3" Ø PIPE	4" Ø POLE	7'-0"	5'-0"	3'-0"	3'-0"	MAJOR PANEL ONLY
36" x 36" WITH 18" x 18"	9.0+2.3	3" Ø PIPE	4" Ø POLE	7'-6"	5'-6"	3'-0"	3'-0"	MAJOR PANEL WITH SUPPLEMENTAL PANEL
36" x 36" WITH 24" x 24"	9.0+4.0	3" Ø PIPE	5" Ø POLE	8'-0"	6'-0"	3'-0"	3'-0"	MAJOR PANEL WITH SUPPLEMENTAL PANEL
36" x 36" WITH 24" x 18"	9.0+3.0	3" Ø PIPE	5" Ø POLE	7'-6"	5'-6"	3'-0"	3'-0"	MAJOR PANEL WITH SUPPLEMENTAL PANEL
48" x 48"	16.0	3 1/2" Ø PIPE	5" Ø POLE	7'-0"	5'-0"	3'-6"	3'-0"	MAJOR PANEL ONLY
48" x 48" WITH 18" x 18"	16.0+2.3	3 1/2" Ø PIPE	5" Ø POLE	7'-6"	5'-6"	3'-6"	3'-0"	MAJOR PANEL WITH SUPPLEMENTAL PANEL
48" x 48" WITH 24" x 24"	16.0+4.0	4" Ø PIPE	6" Ø POLE	8'-0"	6'-0"	3'-6"	3'-6"	MAJOR PANEL WITH SUPPLEMENTAL PANEL
48" x 48" WITH 24" x 18"	16.0+3.0	4" Ø PIPE	5" Ø POLE	7'-6"	5'-6"	3'-6"	3'-0"	MAJOR PANEL WITH SUPPLEMENTAL PANEL
48" x 24"	8.0	(2) 2" Ø PIPE	(2) 3" Ø POLE	7'-0"	5'-0"	3'-0"	3'-0"	MAJOR PANEL ONLY TWO POSTS REQUIRED
48" x 60"	20.0	4" Ø PIPE	6" Ø POLE	7'-0"	5'-0"	3'-6"	3'-6"	MAJOR PANEL ONLY
36" DIA	7.0	2 1/2" Ø PIPE	4" Ø POLE	7'-0"	5'-0"	3'-0"	3'-0"	MAJOR PANEL ONLY
36" x 48" x 48"	5.5	2 1/2" Ø PIPE	3" Ø POLE	7'-0"	5'-0"	3'-0"	3'-0"	MAJOR PANEL ONLY
SCHOOL XING SERIES								
36" x 36"	6.8	2 1/2" Ø PIPE	3" Ø POLE	7'-0"	5'-0"	3'-0"	3'-0"	MAJOR PANEL ONLY
36" x 36" WITH 36" x 12"	6.8+3.0	3" Ø PIPE	4" Ø POLE	7'-0"	5'-0"	3'-0"	3'-0"	MAJOR PANEL WITH SUPPLEMENTAL PANEL
36" x 36" WITH 36" x 18"	6.8+4.5	3" Ø PIPE	4" Ø POLE	7'-6"	5'-6"	3'-0"	3'-0"	MAJOR PANEL WITH SUPPLEMENTAL PANEL
48" x 48"	12.0	3" Ø PIPE	4" Ø POLE	7'-0"	5'-0"	3'-0"	3'-0"	MAJOR PANEL ONLY
48" x 48" WITH 36" x 12"	12.0+3.0	3 1/2" Ø PIPE	5" Ø POLE	7'-0"	5'-0"	3'-6"	3'-0"	MAJOR PANEL WITH SUPPLEMENTAL PANEL
48" x 48" WITH 36" x 18"	12.0+4.5	3 1/2" Ø PIPE	5" Ø POLE	7'-6"	5'-6"	3'-6"	3'-0"	MAJOR PANEL WITH SUPPLEMENTAL PANEL

- NOTES
- Information contained herein is based on 32Lbs/Sq.Ft. per the Wind Oesign Specifications for the Department of Highways.
 - Post Information shown above is figured for a Major Panel mounted by itself, and /or a Major Panel mounted with a Supplemental Panel below
 - The Mounting Heights shown above are figured at:
 - 5 feet in Rural conditions, measured from the bottom of the Major Panel, when used alone, to the near edge of the pavement.
 - 7 feet in Urban (and Municipal) conditions, measured from the bottom of the Major Panel, when used alone, to the near top of the ground or pavement. (see sketches above, top)
 - and 1 foot less than the above, measured from the bottom of the Supplemental Panel, when used below a Major Panel.
 - For Clearance, see Signing Standard Drawing No. 215.
 - For Embedments, see Signing Standard Drawing No. 224 B 22B.

APPROVED: H. J. ANDERSON - DIRECTOR OF HIGHWAYS
BY: *[Signature]* ADMINISTRATOR, ENGINEERING DIVISION

SIGNING
STANDARD DRAWING NO. 212

STATE OF MONTANA
DEPARTMENT OF HIGHWAYS
TYPICAL ERECTION
SPECIFICATION STANDARDS
32 LBS/SQ.FT.

FACE OF SHOULDER OR FACE OF CURB

MAJOR

Supplemental

CLEARANCE (see notes)

FOUNDATION DEPTH

EMBEDMENT (see notes)

FACE OF PAVEMENT OR FACE OF CURB

MAJOR

Supplemental

CLEARANCE (see notes)

FOUNDATION DEPTH

EMBEDMENT (see notes)

FACE OF SHOULDER OR FACE OF CURB

MAJOR

Supplemental

CLEARANCE (see notes)

FOUNDATION DEPTH

EMBEDMENT (see notes)

FACE OF PAVEMENT OR FACE OF CURB

MAJOR

Supplemental

CLEARANCE (see notes)

FOUNDATION DEPTH

EMBEDMENT (see notes)

TYPICAL
ERECTION SPECIFICATION STANDARDS

PRIMARY & SECONDARY HIGHWAYS

40 LBS/SQ.FT.

DRAWN BY: 8-1-73 G. E. G.

CHECKED BY: 8-8-73 C. H. L.

PANEL SIZE (Each)	SQ. FT. (Each)	POST INFORMATION		MOUNTING		HEIGHT		FOUNDATION DEPTH		REMARKS
		URBAN	RURAL	URBAN	RURAL	URBAN	RURAL			
REGULATORY SERIES										
30" x 30"	5.2									
30" x 30" WITH 12" x 6"	5.2 + .5	2 1/2" Ø PIPE	3" Ø POLE	7' -0"		5' -0"		3' -0"	3' -0"	MAJOR PANEL ONLY
36" x 36"	7.5	2 1/2" Ø PIPE	3" Ø POLE	7' -0"		5' -0"		3' -0"	3' -0"	MAJOR PANEL WITH SUPPLEMENTAL PANEL
36" x 36" WITH 12" x 6"	7.5 + .5	3" Ø PIPE	4" Ø POLE	7' -0"		5' -0"		3' -0"	3' -0"	MAJOR PANEL ONLY
48" x 48"	13.3	3" Ø PIPE	4" Ø POLE	7' -0"		5' -0"		3' -0"	3' -0"	MAJOR PANEL WITH SUPPLEMENTAL PANEL
24" x 30"	5.0	3 1/2" Ø PIPE	5" Ø POLE	7' -0"		5' -0"		3' -6"	3' -0"	MAJOR PANEL ONLY
24" x 30" WITH 13" x 13"	5.0 + 1.2	2 1/2" Ø PIPE	3" Ø POLE	7' -0"		5' -0"		3' -0"	3' -0"	MAJOR PANEL ONLY
48" x 60"	20.0	2 1/2" Ø PIPE	4" Ø POLE	7' -0"		5' -0"		3' -6"	3' -6"	MAJOR PANEL WITH SUPPLEMENTAL PANEL
48" x 60" WITH 24" x 18"	20.0 + 3.0	4" Ø PIPE	6" Ø POLE	7' -0"		5' -6"		3' -6"	3' -6"	MAJOR PANEL ONLY
24" x 24"	4.0	5" Ø PIPE	6" Ø POLE	7' -6"		5' -0"		3' -0"	3' -0"	MAJOR PANEL ONLY
24" x 24" WITH 24" x 18"	4.0 + 3.0	2 1/2" Ø PIPE	3" Ø POLE	7' -0"		5' -0"		3' -0"	3' -0"	MAJOR PANEL WITH SUPPLEMENTAL PANEL
36" x 36"	9.0	2 1/2" Ø PIPE	4" Ø POLE	7' -6"		5' -6"		3' -0"	3' -0"	MAJOR PANEL ONLY
36" x 36" WITH 24" x 18"	9.0 + 3.0	3" Ø PIPE	5" Ø POLE	7' -6"		5' -0"		3' -6"	3' -0"	MAJOR PANEL WITH SUPPLEMENTAL PANEL
30" x 30"	6.3	3" Ø PIPE	4" Ø POLE	7' -0"		5' -0"		3' -0"	3' -0"	MAJOR PANEL ONLY
36" x 48"	12.0	3 1/2" Ø PIPE	5" Ø POLE	7' -0"		5' -0"		3' -6"	3' -0"	MAJOR PANEL ONLY
24" x 12"	2.0	2" Ø PIPE	3" Ø POLE	7' -0"		5' -0"		3' -0"	3' -0"	MAJOR PANEL ONLY
36" x 24"	6.0	2" Ø PIPE	4" Ø POLE	7' -0"		5' -0"		3' -0"	3' -0"	MAJOR PANEL ONLY
30" x 36"	7.5	2 1/2" Ø PIPE	4" Ø POLE	7' -0"		5' -0"		3' -0"	3' -0"	MAJOR PANEL ONLY
30" x 18"	3.8	3" Ø PIPE	4" Ø POLE	7' -0"		5' -0"		3' -0"	3' -0"	MAJOR PANEL ONLY
36" x 12"	3.0	2" Ø PIPE	3" Ø POLE	7' -0"		5' -0"		3' -0"	3' -0"	MAJOR PANEL ONLY
18" x 24"	3.0	2" Ø PIPE	3" Ø POLE	7' -0"		5' -0"		3' -0"	3' -0"	MAJOR PANEL ONLY
12" x 18"	1.5	2" Ø PIPE	3" Ø POLE	7' -0"		5' -0"		3' -0"	3' -0"	MAJOR PANEL ONLY
12" x 6"	.5	2" Ø PIPE	3" Ø POLE	7' -0"		5' -0"		3' -0"	3' -0"	MAJOR PANEL ONLY
36" x 36" x 36"	3.9	2 1/2" Ø PIPE	3" Ø POLE	7' -0"		5' -0"		3' -0"	3' -0"	MAJOR PANEL ONLY
48" x 48" x 48"	6.6	2 1/2" Ø PIPE	4" Ø POLE	7' -0"		5' -0"		3' -0"	3' -0"	MAJOR PANEL ONLY
WARNING SERIES										
30" x 30"	6.3	2 1/2" Ø PIPE	4" Ø POLE	7' -0"		5' -0"		3' -0"	3' -0"	MAJOR PANEL ONLY
30" x 30" WITH 18" x 18"	6.3 + 2.3	3" Ø PIPE	4" Ø POLE	7' -6"		5' -6"		3' -0"	3' -0"	MAJOR PANEL WITH SUPPLEMENTAL PANEL
30" x 30" WITH 24" x 24"	6.3 + 4.0	3" Ø PIPE	5" Ø POLE	7' -0"		5' -0"		3' -0"	3' -0"	MAJOR PANEL WITH SUPPLEMENTAL PANEL
30" x 30" WITH 24" x 18"	6.3 + 3.0	3" Ø PIPE	4" Ø POLE	7' -6"		5' -6"		3' -0"	3' -0"	MAJOR PANEL WITH SUPPLEMENTAL PANEL
36" x 36"	9.0	3" Ø PIPE	4" Ø POLE	7' -0"		5' -0"		3' -0"	3' -0"	MAJOR PANEL ONLY
36" x 36" WITH 18" x 18"	9.0 + 2.3	3" Ø PIPE	" Ø POLE	7' -6"		5' -6"		3' -0"	3' -0"	MAJOR PANEL WITH SUPPLEMENTAL PANEL
36" x 36" WITH 24" x 24"	9.0 + 4.0	3 1/2" Ø PIPE	5" Ø POLE	8' -0"		6' -0"		3' -6"	3' -0"	MAJOR PANEL WITH SUPPLEMENTAL PANEL
36" x 36" WITH 24" x 18"	9.0 + 3.0	3 1/2" Ø PIPE	5" Ø POLE	7' -6"		5' -6"		3' -6"	3' -0"	MAJOR PANEL WITH SUPPLEMENTAL PANEL
48" x 48"	16.0	4" Ø PIPE	6" Ø POLE	7' -0"		5' -0"		3' -6"	3' -6"	MAJOR PANEL ONLY
48" x 48" WITH 18" x 18"	16.0 + 2.3	4" Ø PIPE	6" Ø POLE	7' -6"		5' -6"		3' -6"	3' -6"	MAJOR PANEL WITH SUPPLEMENTAL PANEL
48" x 48" WITH 24" x 24"	16.0 + 4.0	4" Ø PIPE	6" Ø POLE	8' -0"		6' -0"		3' -6"	3' -6"	MAJOR PANEL WITH SUPPLEMENTAL PANEL
48" x 48" WITH 24" x 18"	16.0 + 3.0	4" Ø PIPE	6" Ø POLE	7' -6"		5' -6"		3' -6"	3' -6"	MAJOR PANEL WITH SUPPLEMENTAL PANEL
48" x 24"	8.0	(2) 2 1/2" Ø PIPE	(2) 3" Ø POLE	7' -0"		5' -0"		3' -0"	3' -6"	MAJOR PANEL ONLY TWO POSTS REQUIRED
48" x 60"	20.0	4" Ø PIPE	6" Ø POLE	7' -0"		5' -0"		3' -0"	3' -6"	MAJOR PANEL ONLY
36" DIA	7.0	2 1/2" Ø PIPE	4" Ø POLE	7' -0"		5' -0"		3' -0"	3' -0"	MAJOR PANEL ONLY
36" x 48" x 48"	5.5	2 1/2" Ø PIPE	3" Ø POLE	7' -0"		5' -0"		3' -0"	3' -0"	MAJOR PANEL ONLY
SCHOOL XING SERIES										
36" x 36"	6.8	3" Ø PIPE	4" Ø POLE	7' -0"		5' -0"		3' -0"	3' -0"	MAJOR PANEL ONLY
36" x 36" WITH 36" x 12"	6.8 + 3.0	3" Ø PIPE	4" Ø POLE	7' -0"		5' -0"		3' -0"	3' -0"	MAJOR PANEL WITH SUPPLEMENTAL PANEL
36" x 36" WITH 36" x 18"	6.8 + 4.5	3" Ø PIPE	5" Ø POLE	7' -6"		5' -6"		3' -0"	3' -0"	MAJOR PANEL WITH SUPPLEMENTAL PANEL
48" x 48"	12.0	3 1/2" Ø PIPE	5" Ø POLE	7' -0"		5' -0"		3' -0"	3' -0"	MAJOR PANEL ONLY
48" x 48" WITH 36" x 12"	12.0 + 3.0	3 1/2" Ø PIPE	5" Ø POLE	7' -0"		5' -0"		3' -6"	3' -0"	MAJOR PANEL WITH SUPPLEMENTAL PANEL
48" x 48" WITH 36" x 18"	12.0 + 4.5	4" Ø PIPE	6" Ø POLE	7' -6"		5' -6"		3' -6"	3' -6"	MAJOR PANEL WITH SUPPLEMENTAL PANEL

NOTES

1. Information contained herein is based on 40Lbs/Sq.Ft. per the Wind Design Specifications for the Department of Highways.

2. Post Information shown above is figured for a Major Panel mounted by itself, and /or a Major Panel mounted with a Supplemental Panel below.

3. The Mounting Heights shown above are figured at:
a) 5 feet in Rural conditions, measured from the bottom of the Major Panel, when used alone, to the near edge of the pavement;
b) 7 feet in Urban (and Municipal) conditions, measured from the bottom of the Major Panel, when used alone, to the near top of the ground or pavement. (see sketches above, top)
c) and 1 foot less than the above, measured from the bottom of the Supplemental Panel, when used below a Major Panel.

4. For Clearance, see Signing Standard Drawing No. 215.

5. For Embedments, see Signing Standard Drawing No. 224 & 22B.

APPROVED H. J. ANDERSON - DIRECTOR OF HIGHWAYS

BY *[Signature]* ADMINISTRATOR - ENGINEERING DIVISION

SIGNING

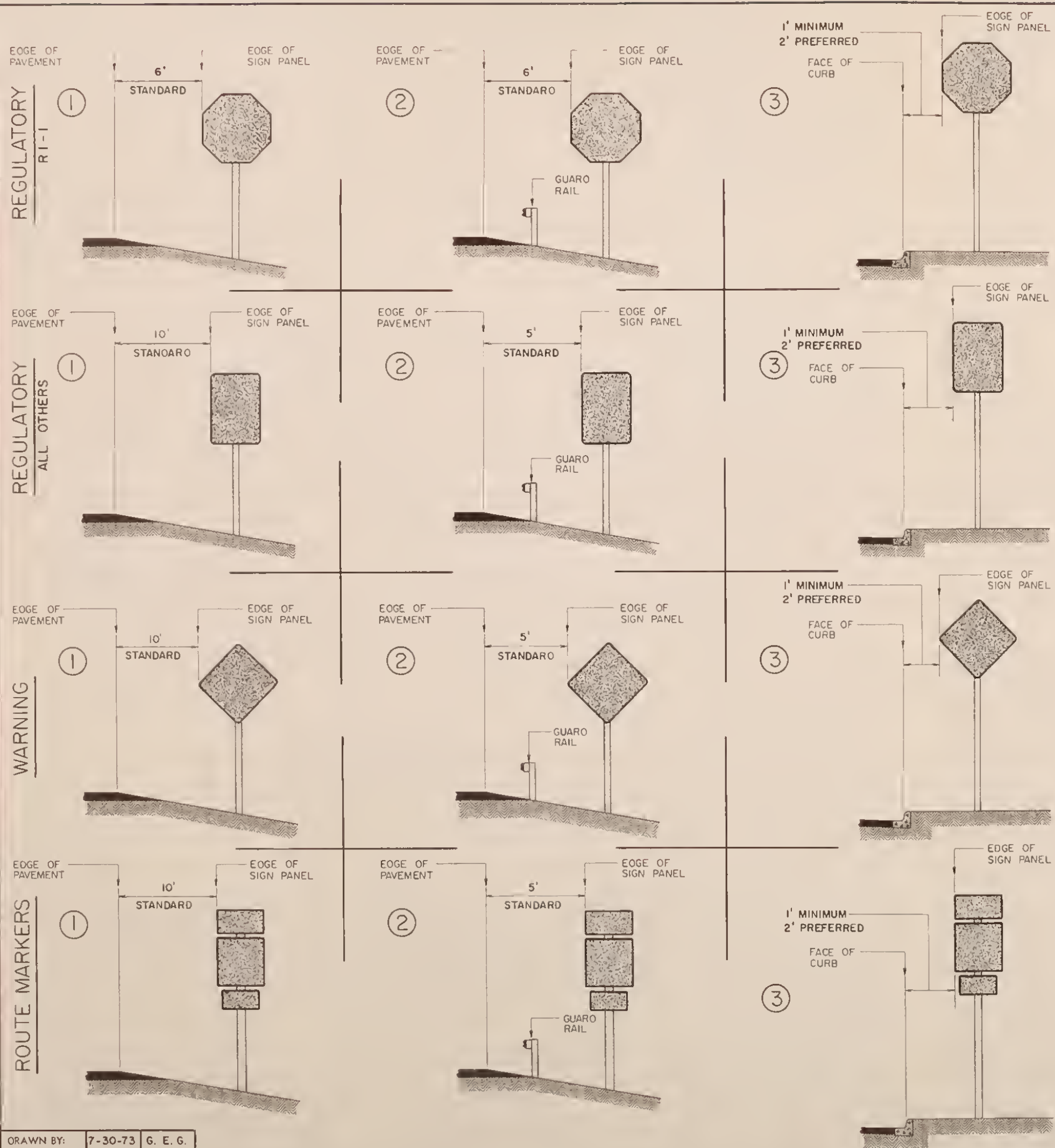
STANDARD DRAWING NO. 213

STATE OF MONTANA

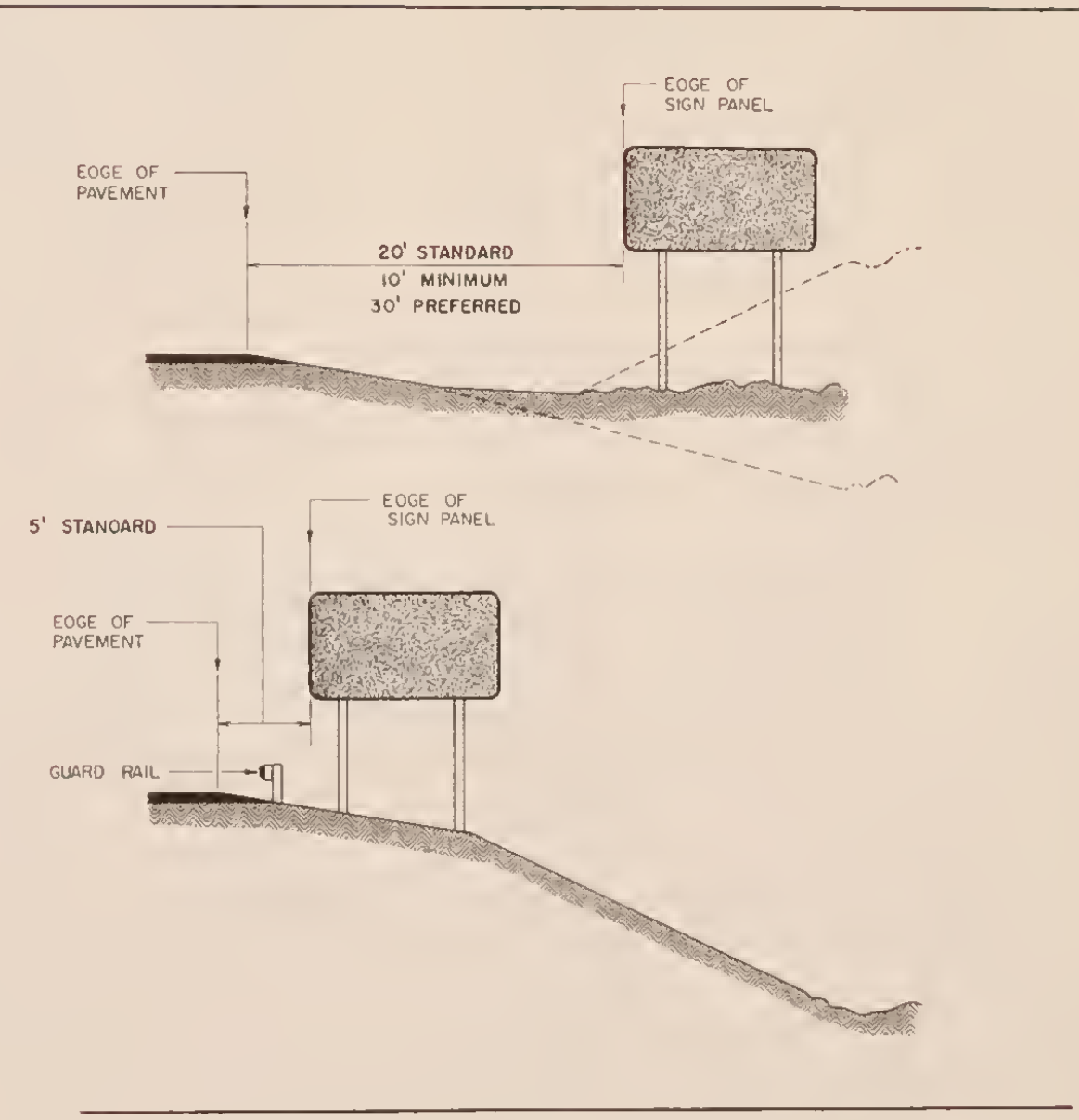
DEPARTMENT OF HIGHWAYS

TYPICAL ERECTION SPECIFICATION STANDARDS

40 LBS/SQ.FT.



GUIDE SIGNS



NOTES

- Information contained herein is the recommended clearances that shall be used when placing all signs.
- For Regulatory, Warning, and Route Marker Signs, and their assemblies, of under 10.0 Sq. Ft. in Area:
 - diagrams located in column ① shall be used when placing these signs in standard RURAL conditions, column ② shall be used when placing these signs behind Guard Rail in RURAL conditions, column ③ shall be used when placing these signs in URBAN conditions where there is adequate clearance and sidewalk width;
 - where sidewalk width is limited in URBAN conditions, see Signing Standard Drawing No. 227 for placement details.
- For Regulatory (All Others), Warning, and Route Marker Signs, and their assemblies, of 10.0 Sq. Ft. and larger in Area, the clearance should be 20' from edge of pavement in column ① for standard RURAL conditions. The clearances listed in columns ② and ③ shall remain as shown.
- For Guide Signs, and their assemblies:
 - the diagrams located above shall be used when placing these signs in the given RURAL conditions;
 - for placement of these signs in URBAN conditions, see the Sign Location and Specification Sheets in the Signing Plans for each individual sign;
 - the maximum clearance of these signs shall not exceed 35' in any condition.

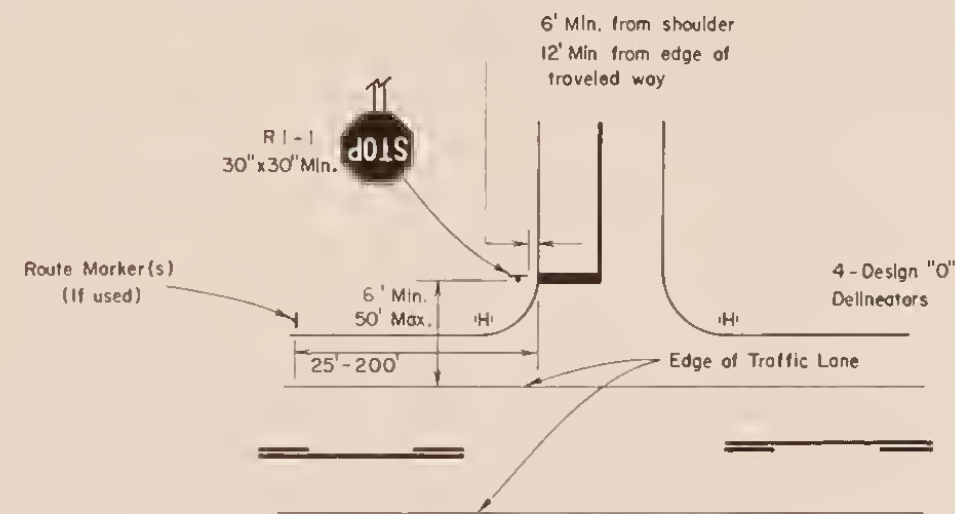
APPROVED: H. J. ANDERSON - DIRECTOR OF HIGHWAYS
 BY: *Jack R. Baker*
 ADMINISTRATOR - ENGINEERING DIVISION

SIGNING
 STANDARD DRAWING NO. 215

STATE OF MONTANA
 DEPARTMENT OF HIGHWAYS
 TYPICAL SIGN CLEARANCE STANDARD

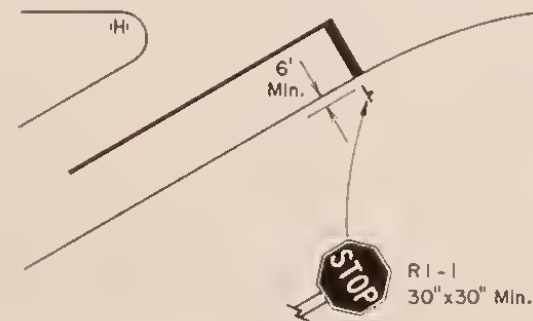
DRAWN BY: 7-30-73 G. E. G.
 CHECKED BY: 8-8-73 C. H. L.

TYPICAL APPROACH ROAD SIGNING

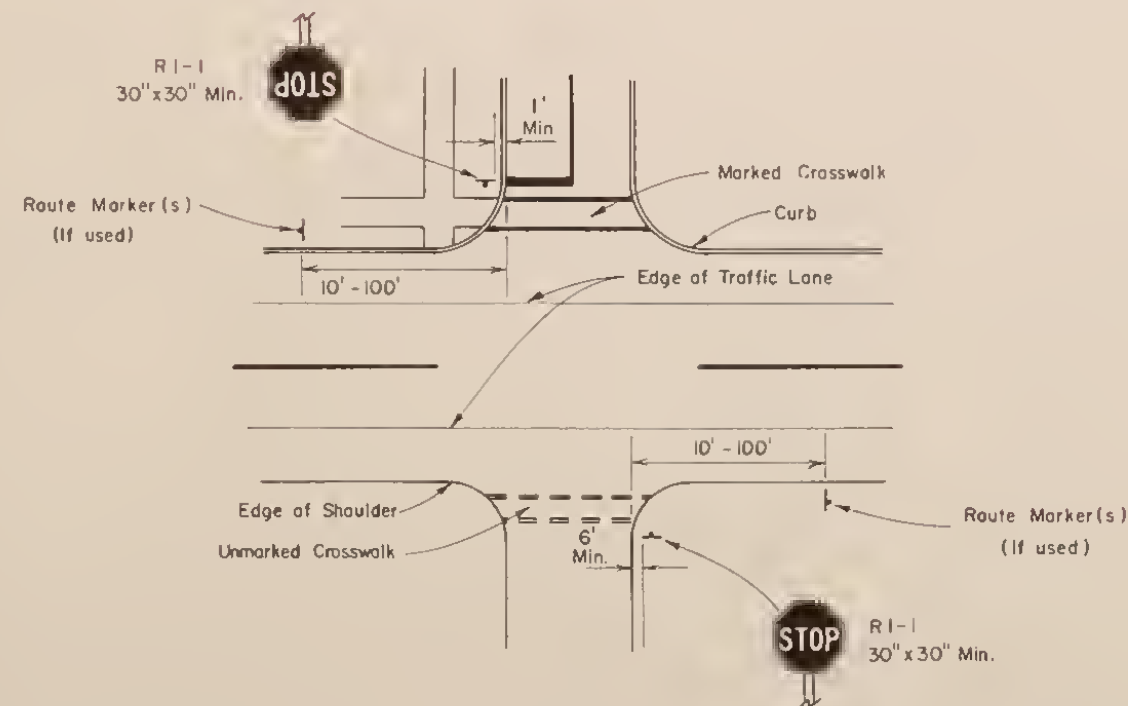


NOTE:

Place R1-1 Sign at the beginning of curb radius, or shoulder radius, or 4 feet min. in advance of the marked or unmarked Crosswalk.



RURAL

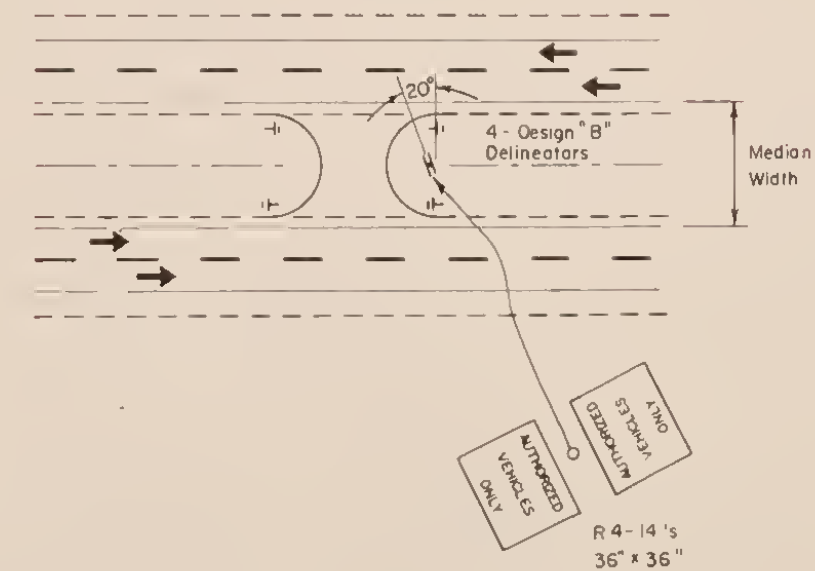


URBAN

MEDIAN U-TURN SIGNING

NOTES:

- For Median Widths of 76 feet or less, the R4-14 Signs shall be mounted back to back. They shall be placed at the centerline of the Median and on the side of the U-Turn away from the nearest Interchange.
- For Median Widths greater than 76 feet, the R4-14 signs shall be installed separately on both sides of the U-Turn at clearances specified in the Sign Location and Specifications.
- For openings through Median Guard Rails, the sign post shall be placed in line with the Guard Rail Posts.



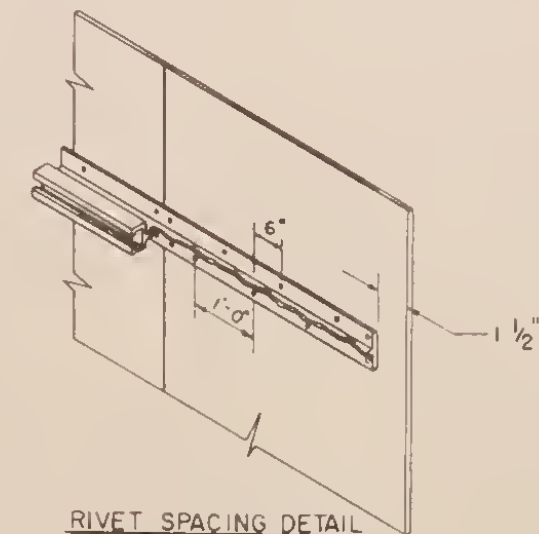
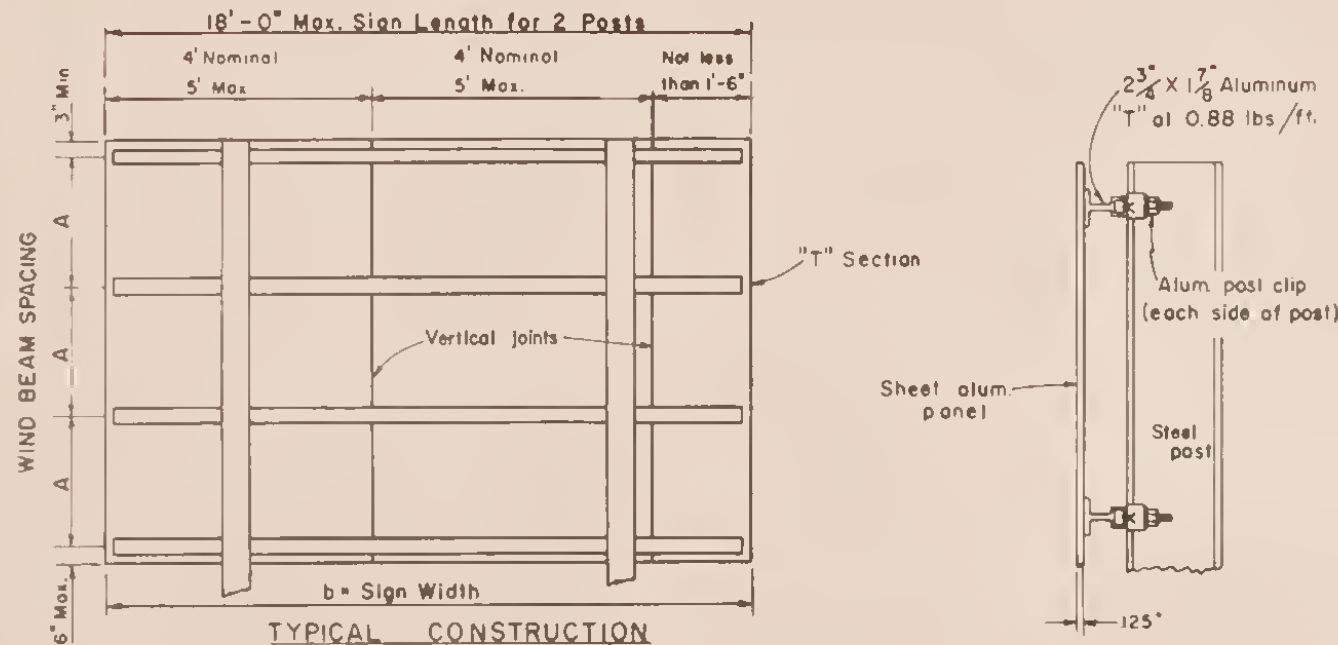
APPROVED: H. J. ANDERSON - DIRECTOR OF HIGHWAYS
BY: *John R. Bickel*
ADMINISTRATOR - ENGINEERING DIVISION

SIGNING
STANDARD DRAWING NO. 216

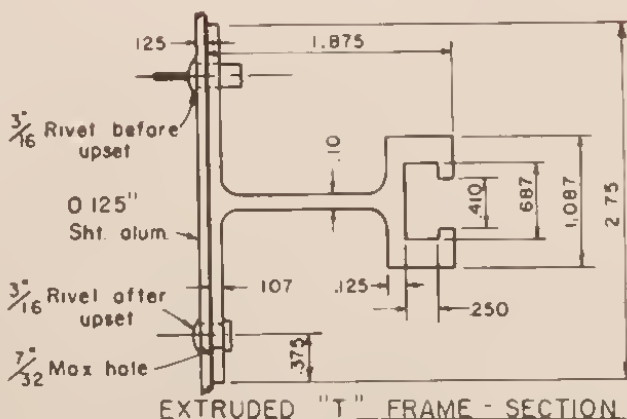
STATE OF MONTANA
DEPARTMENT OF HIGHWAYS
TYPICAL APPROACH ROAD &
MEDIAN U-TURN SIGNING

DRAWN BY:	3-30-73	G. E. G.
CHECKED BY:	3-30-73	

ALUMINUM SHEET INCREMENT
GUIDE SIGN



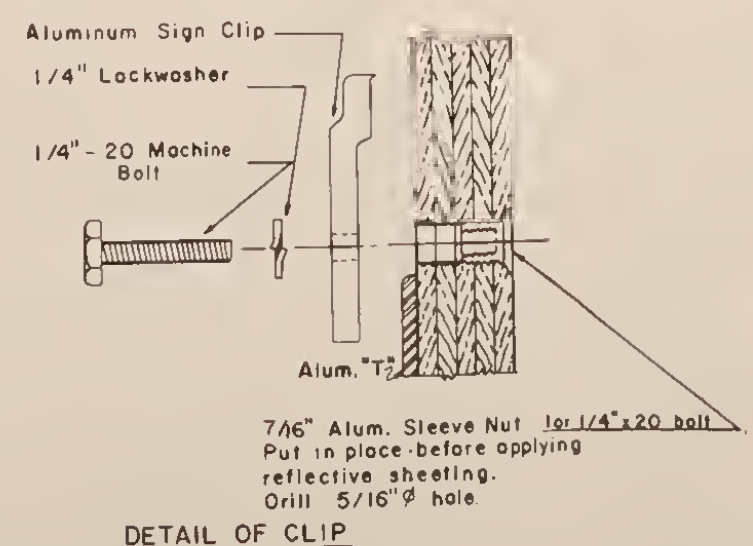
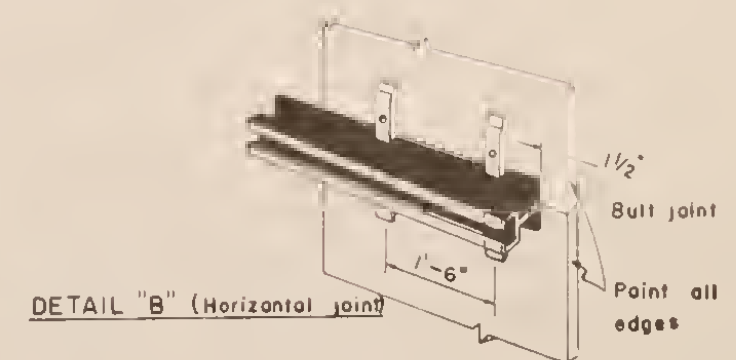
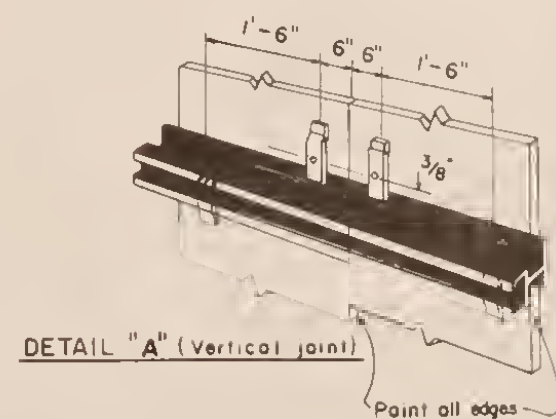
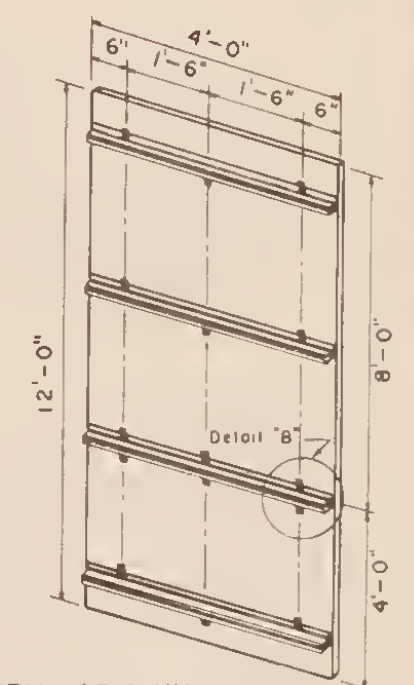
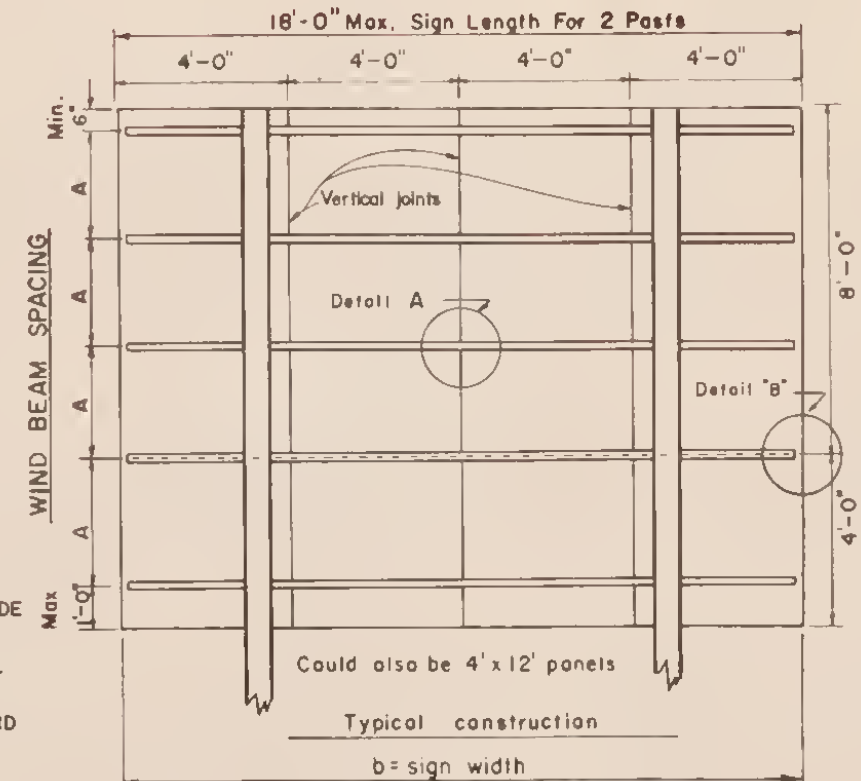
NOTE:
Rivets 6" apart staggered from one side to another on horizontal extruded T-Section.
Rivets doubled (both sides of extruded T-Section) at horizontal and vertical joints in sheet aluminum face and at ends of extruded T-section.



NOTES GENERAL
ALL HORIZONTAL JOINTS SHALL OCCUR AT A "T" SECTION.
NO SPLICES ARE ALLOWED IN EXTRUDED "T" SECTIONS.
ALL SCREWS, BOLTS, AND LOCKWASHERS SHALL BE OF ALUMINUM ALLOY, STAINLESS STEEL, OR CAONIUM PLATED STEEL.
ONLY ALUMINUM RIVETS SHALL BE USED.

NOTES ALUMINUM SIGNS
1. ALL ALUMINUM SIGNS SHALL CONFORM TO SECTION 8B, ART. M-320.01 (B) & M-320.02 (A) OF THE STANDARD SPECIFICATIONS.
2. SIGNS LESS THAN 4'-0" HIGH AND 6'-0" LONG SHALL BE MADE OF A SINGLE SHEET OF ALUMINUM.
3. SIGNS UP TO, AND INCLUDING, 6'-0" HIGH SHALL HAVE NO HORIZONTAL JOINTS, AND NO SHEET SHALL BE LESS THAN 1'-6" WIDE.
4. SIGNS OVER 6'-0" HIGH MAY HAVE HORIZONTAL AND VERTICAL JOINTS, HOWEVER, NO SHEET SHALL BE LESS THAN 1'-6" WIDE OR 1'-6" HIGH.
5. TIGHTEN POST CLIP NUTS TO 225 IN/LB TORQUE USING DRY, CLEAN THREADS.
PLYWOOD SIGNS
1. ALL PLYWOOD SIGNS SHALL CONFORM TO SECTION 8B, ART. M-320.01 (C) & M-320.02 (B) OF THE STANDARD SPECIFICATIONS.
2. SIGNS 4'-0" HIGH OR GREATER SHALL HAVE NO PANEL LESS THAN 4'-0" IN HEIGHT.
3. SIGNS UNDER 4'-0" HIGH SHALL NOT HAVE HORIZONTAL JOINTS.
4. SIGNS WITH WIDTHS THAT ARE NOT IN MULTIPLES OF 4'-0" SHALL HAVE OOO PANEL ON INSIDE EDGE.
5. FOR SIGNS OVER 10'-0" IN HEIGHT, THE FULL HEIGHT MAY BE OBTAINED WITH PANELS HAVING A FACTORY SCARFED JOINT IN LIEU OF USING STANDARD LENGTH PANEL AS SHOWN.
6. NO INDIVIDUAL PANEL SHALL BE SMALLER THAN 1'-6" WIDE BY 4'-0" HIGH.

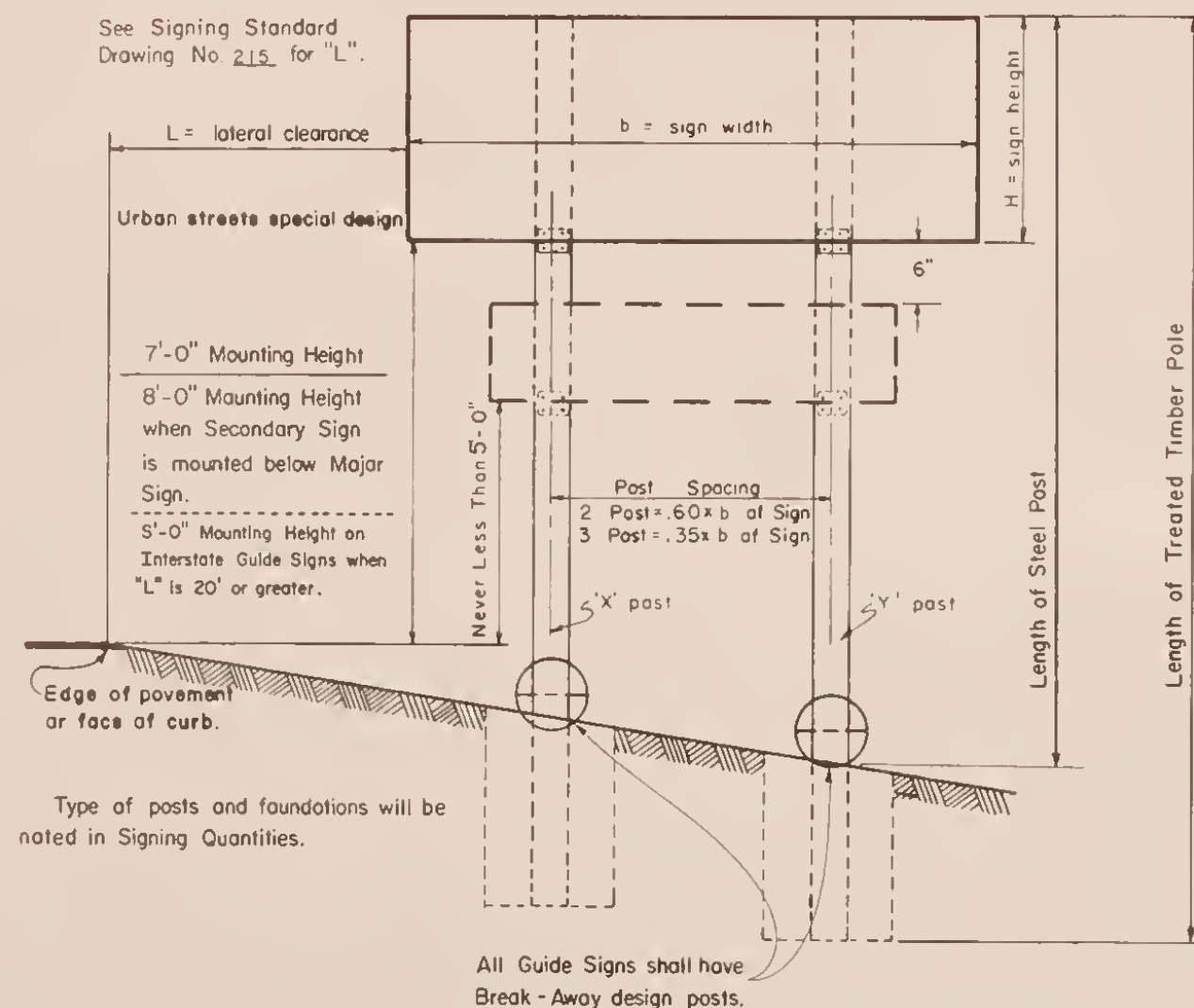
WIND BEAM CHART		
WIND BEAM SPACING "A"	MAXIMUM WIDTH (b)	
	2 POST	3 POST
1' - 8"	18' - 0"	27' - 0"
1' - 10"	17' - 0"	25' - 8"
2' - 0"	16' - 6"	24' - 8"
2' - 6"	14' - 9"	22' - 0"
3' - 0"	13' - 6"	20' - 0"
3' - 6"	12' - 6"	18' - 6"



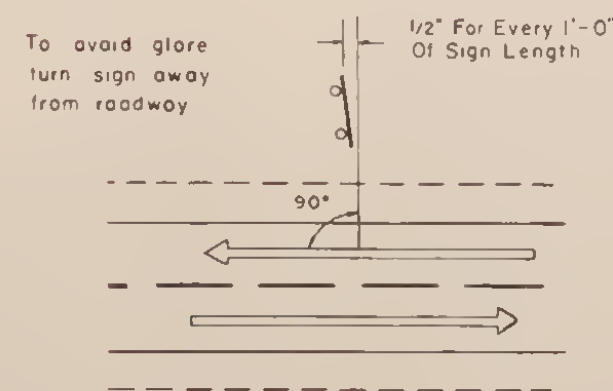
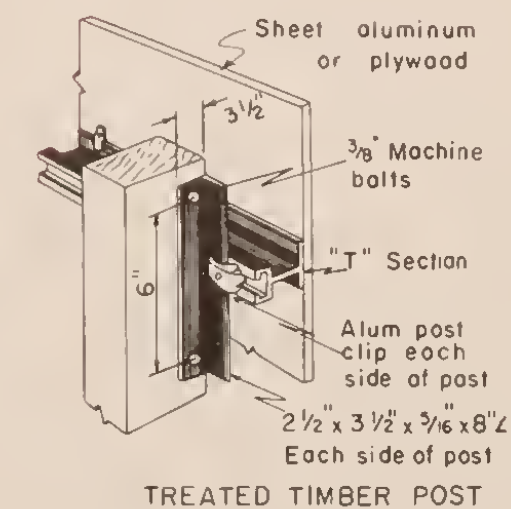
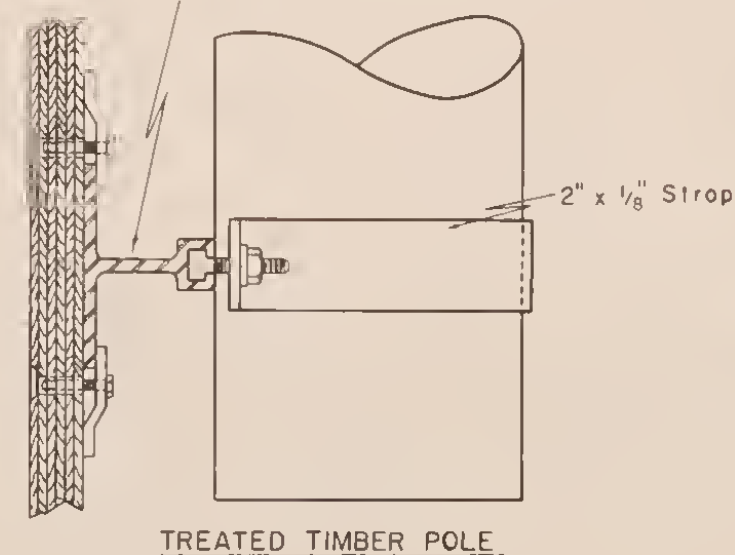
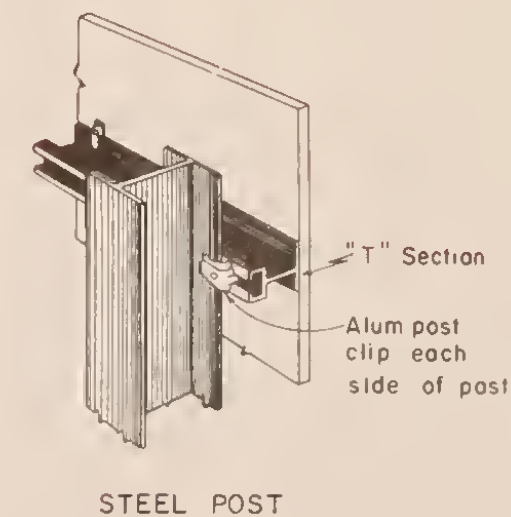
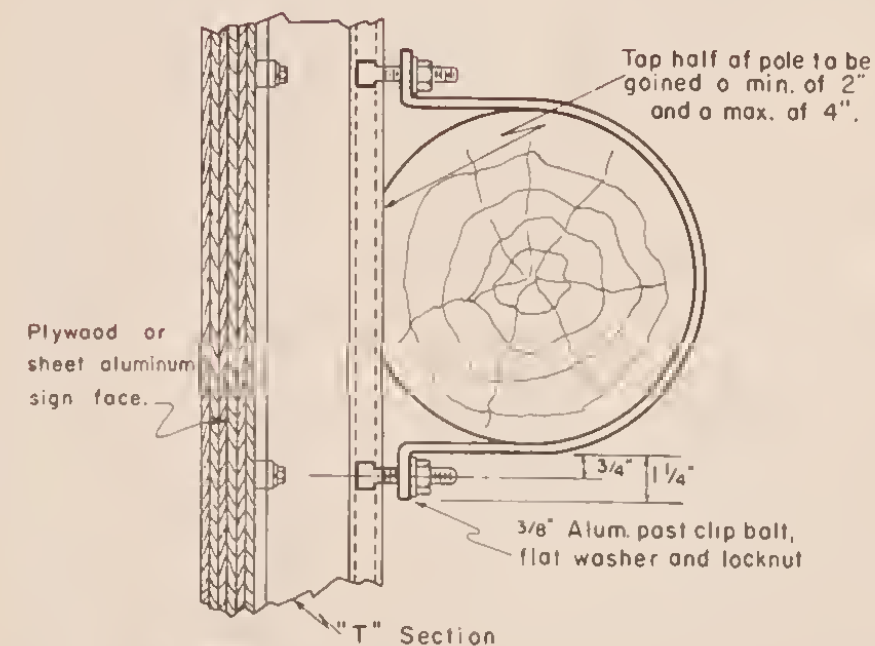
APPROVED: H. J. ANDERSON - DIRECTOR OF HIGHWAYS
BY: *Jack D. Borchert*
ADMINISTRATOR - ENGINEERING DIVISION
SIGNING
STANDARD DRAWING NO. 219
STATE OF MONTANA
DEPARTMENT OF HIGHWAYS
GENERAL GUIDE SIGN
CONSTRUCTION DETAILS

DRAWN BY: 3-30-73 G. E. G.
CHECKED BY: 3-30-73 GAG

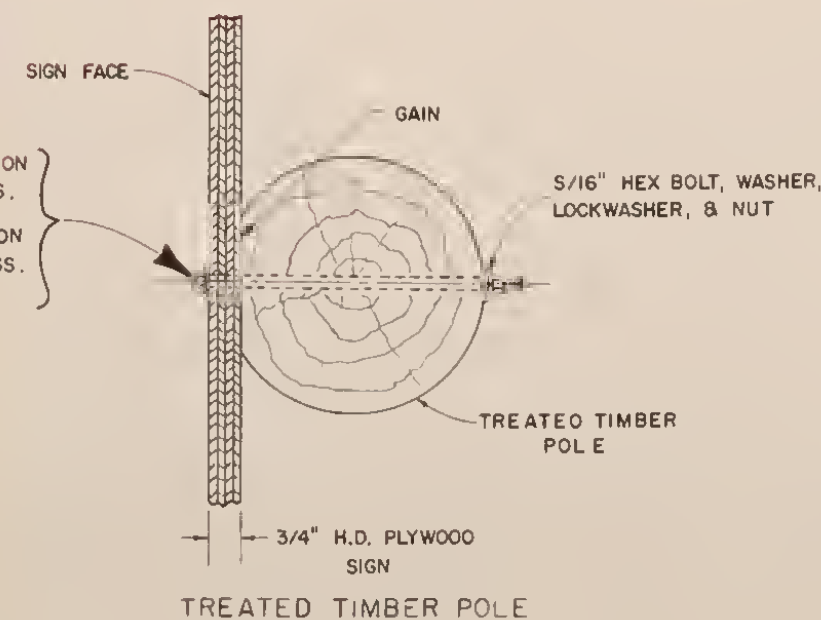
GUIDE SIGN PLACEMENT



GUIDE SIGN MOUNTING DETAILS



USE 2 BOLTS PER SIGN ON SINGLE POST MOUNTINGS.
USE 4 BOLTS PER SIGN ON DOUBLE POST MOUNTINGS. (2 PER POST)



NOTE:

- 1 Mounting systems shown are typical. Other systems may be approved by the engineer.
- 2 All steel hardware shall be galvanized.

APPROVED: H. J. ANDERSON - DIRECTOR OF HIGHWAYS
BY: *Jack R. Borchert*
ADMINISTRATOR - ENGINEERING DIVISION

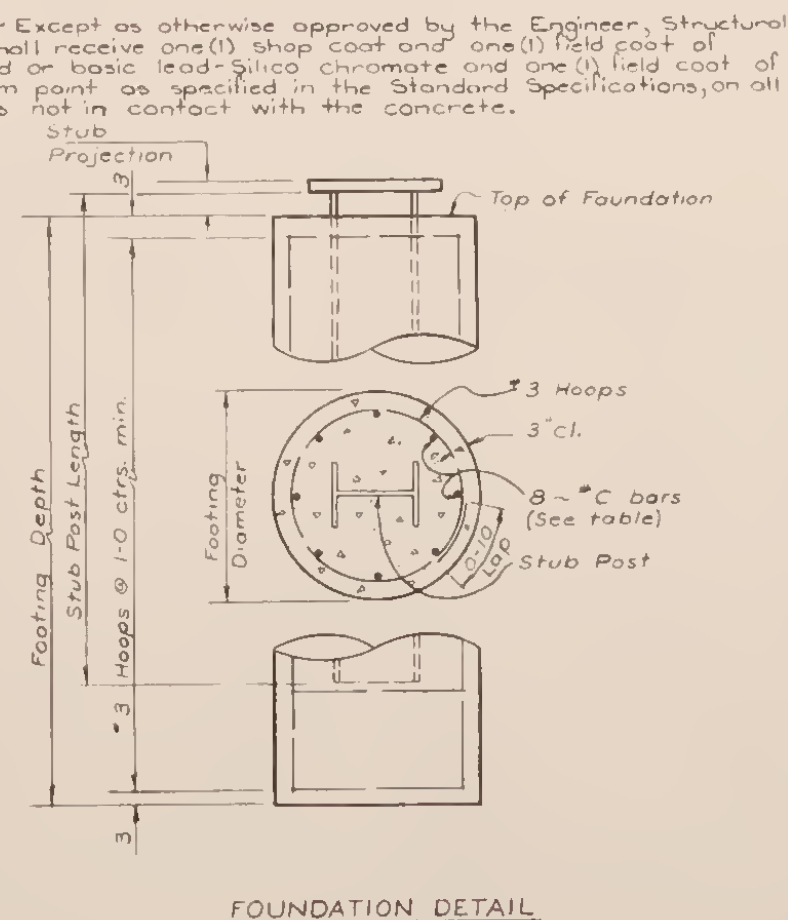
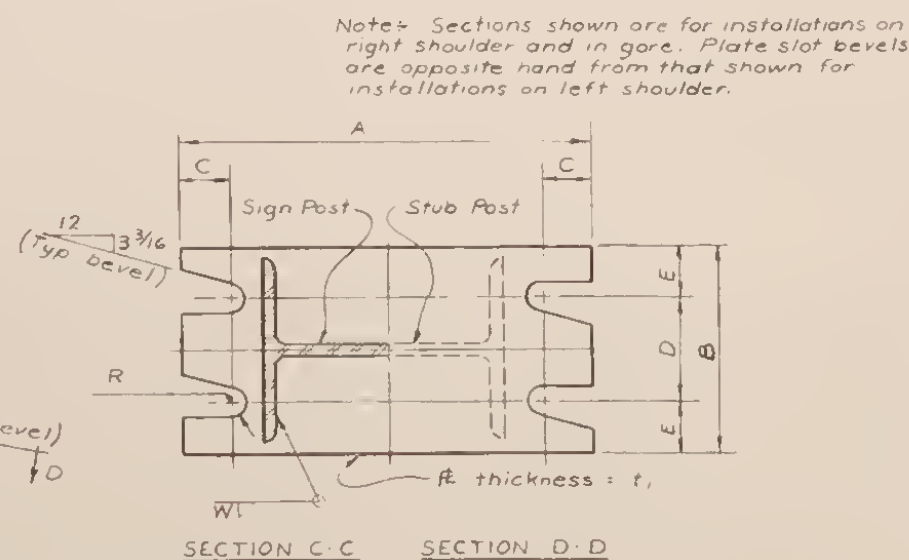
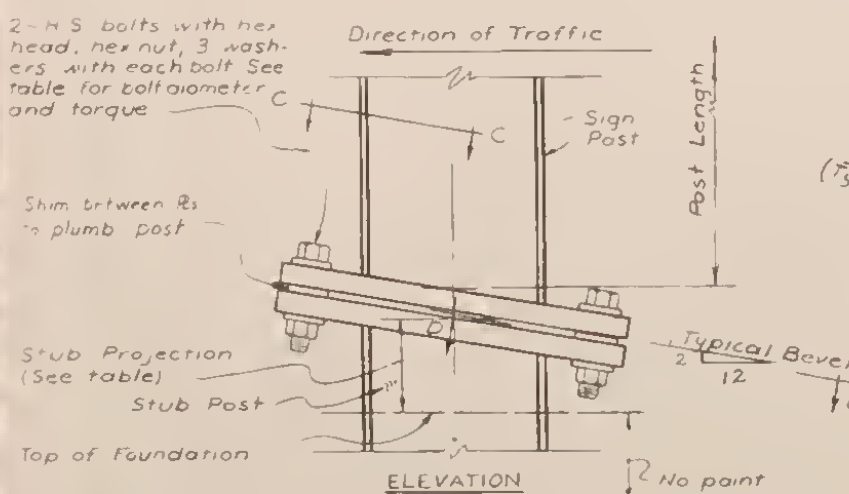
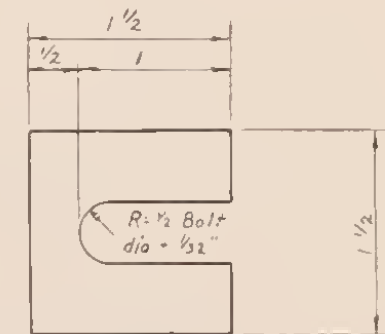
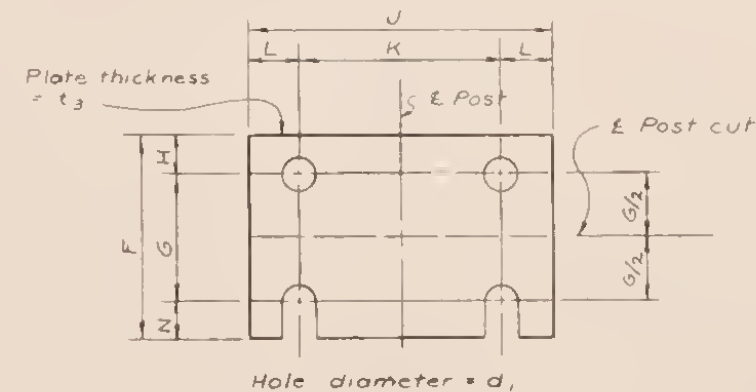
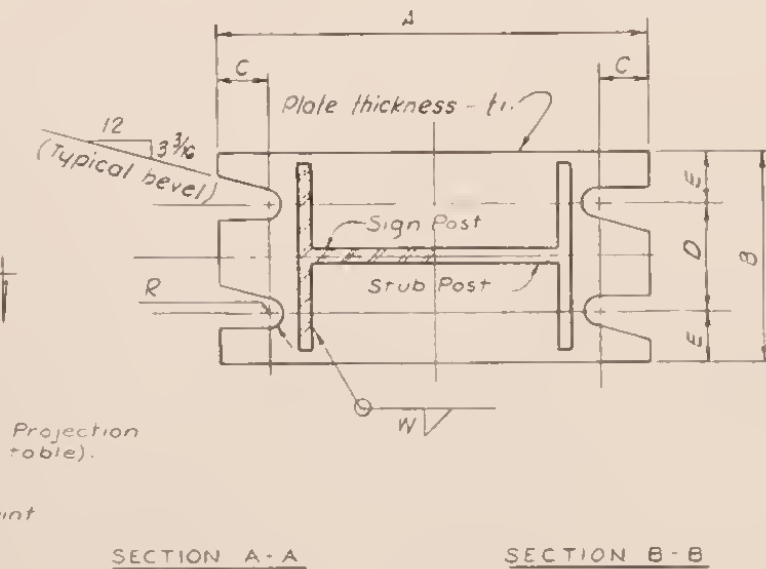
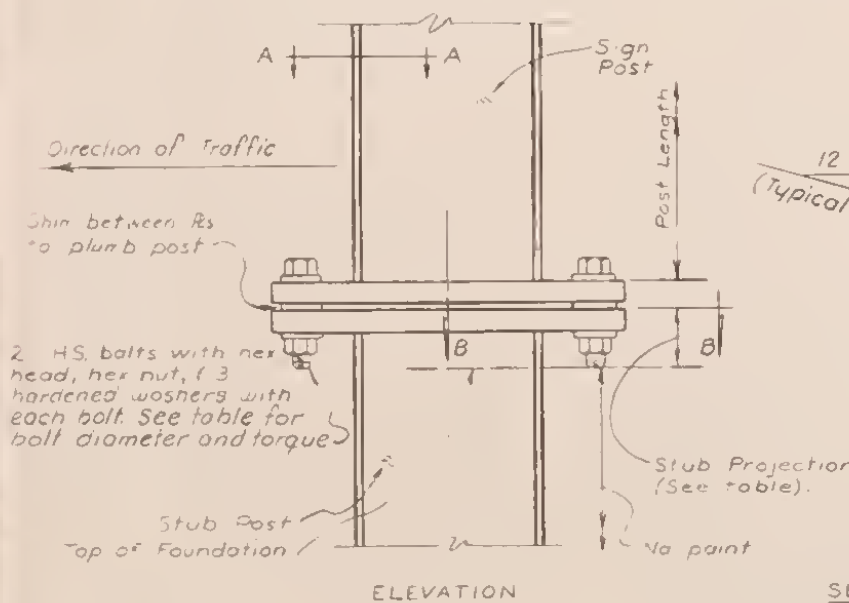
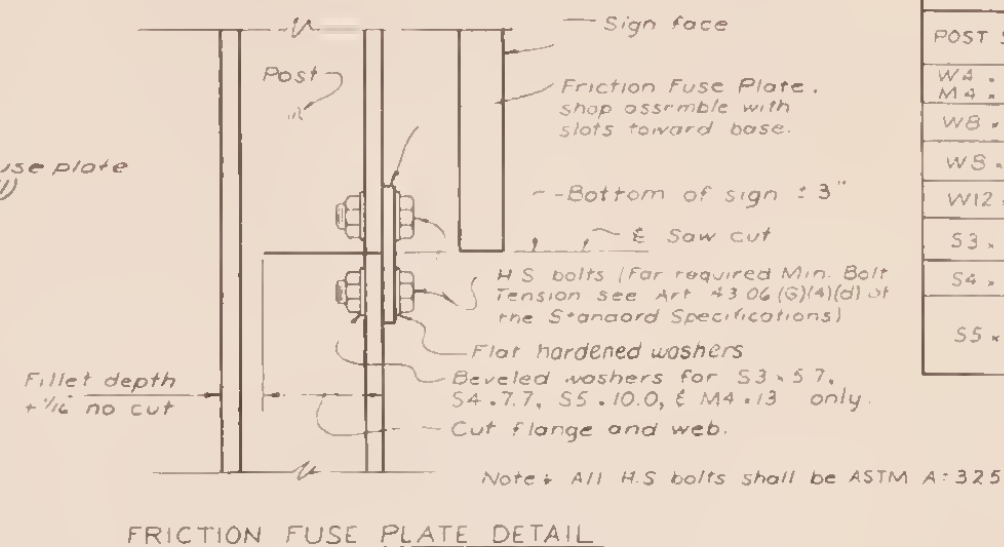
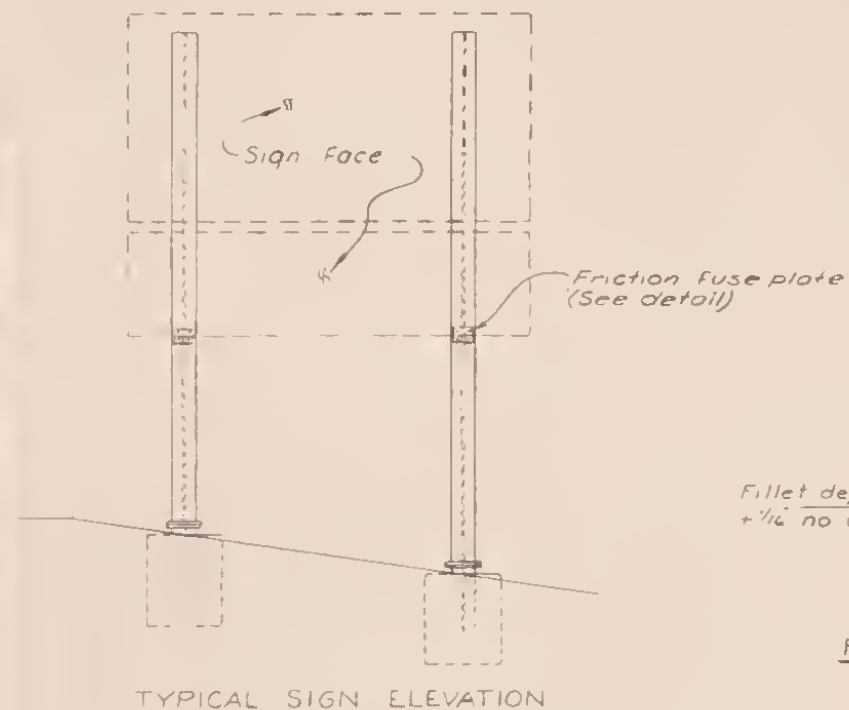
SIGNING
STANDARD DRAWING NO. 220

STATE OF MONTANA
DEPARTMENT OF HIGHWAYS
GUIDE SIGN MOUNTING AND
PLACEMENT DETAILS

DRAWN BY: 3-30-73 G. E. G.
CHECKED BY:

1. Assemble post to stub with bolts and one flat washer between plates.
2. Shim as required to plumb post.
3. Tighten bolts in a systematic order to the prescribed torque. (See Table).
4. Loosen each bolt and retighten to prescribed torque in the same order as original tightening DO NOT OVERTIGHTEN.
5. Burr threads at junction with nut using a center punch to prevent nut loosening.

BASE CONNECTION DATA											FUSE PLATE DATA											FOUNDATION DATA						
POST SIZE	BOLT SIZE & TORQUE	DIMENSIONS								WEIGHT OF EACH BREAK-AWAY DEVICE	DIMENSIONS										BOLT DIA.	WEIGHT OF EACH FUSE DEVICE	FTG. DEPTH	STUB LENGTH	STUB PROJ.	FTG. DIA.	BARC. SIZE	WEIGHT OF EACH STUB POST
		A	B	C	D	E	F	G	H		I	J	K	L	N	d ₁	d ₂											
W4 x 13 M4 x 13	5/8" x 2 3/4 Torque = 480 in. lbs.	8 1/2	5	3/4	2 3/4	1 1/8	3/4	5/16	1 1/2	21.58 lbs.	3 3/4	2	1 1/8	4	2 1/4	7/8	5/8	1 1/4	3/8	5/8	1 60 lbs.	3-0	2-0	3	1-6	5	26.00	
W8 x 17	5/8" x 3 1/2 Torque = 780 in. lbs.	12 1/2	6 1/8	3/4	5	1 1/8	3/4	5/16	1 1/2	37.00	4 1/2	2 1/2	1 1/4	5 1/4	2 3/4	1 1/4	3/4	1 1/4	1/2	3/4	3 27	4-0	2-6	3	1-9	7	42.50	
WS x 24	3/4" x 3 1/2 Torque = 780 in. lbs.	13	7 1/8	3/4	5	1 1/4	1	5/16	1 3/2	60.86	4 1/2	2 1/2	1 1/2	5	3 1/2	1 1/4	1/8	1 3/4	9/16	3/4	4 26	5-0	3-0	2 1/2	2-0	9	72.00	
W12 x 27	3/4" x 3 1/2 Torque = 780 in. lbs.	17	7 1/2	7/8	5	1 1/4	1	5/16	1 3/2	78.54	5 1/8	3	1 1/2	6 1/2	3 1/2	1 1/2	7/8	1 5/8	9/16	7/8	5 42	6-0	3-0	2 1/2	2-0	9	81.00	
S3 x 5.7	1/2" x 2 1/2 Torque = 240 in. lbs.	8	3	3/4	1 1/2	3/4	3/8	1/4	9/32	10.37	3 1/8	1 1/4	1 1/8	2 1/4	1 1/2	9/16	1/2	9/16	1/4	1/2	64	3-0	1-6	3	1-6	4	8.55	
S4 x 7.7	1/2" x 2 1/2 Torque = 240 in. lbs.	8	3	3/4	1 1/2	3/4	5/8	1/4	9/32	10.45	3 1/8	1 1/2	1 1/8	2 1/4	1 1/2	9/16	1/2	7/8	1/4	1/2	64	3-0	1-6	3 1/2	1-6	4	11.55	
S5 x 10.0	5/8" x 2 3/4 Torque = 480 in. lbs.	9 1/2	4	3/4	2	1	3/4	1/4	1 1/2	19.08	3 1/8	1 1/2	1 1/8	3	1 1/2	9/16	1/2	9/16	1/4	1/2	65	3-0	1-6	3 1/2	1-6	5	15.00	



Furnish 2~.012" thick and 2~.032" thick
shims per post. Shims shall be fabricated
from brass shim stock or strip conforming
to ASTM-B36.

SHIM DETAIL

NOTES

SPECIFICATIONS - Montana State Highway Commission Standard Specifications for Road and Bridge Construction 1970 Edition, and any amendments thereto, and Special Provisions shall govern unless otherwise noted. Design of posts and footings prepared in accordance with AASHTO Specifications for the Design and Construction of Structural Supports for Highway Signs, 1968 Edition.

CONCRETE - Concrete shall be Class A or DD with a wood float finish on top. Form top 12 inches of foundation.

STRUCTURAL STEEL - For requirements governing structural steels and their fabrications, see Section 4.3 of the Standard Specifications. To avoid oversight, these requirements shall be clearly noted on the shop drawings.

APPROVAL - Shop plans shall be approved by the State of Montana Department of Highways before fabrication is begun.

PAYMENT - The unit price bid per pound for steel posts shall be full payment for the steel posts and roofings complete in place including all concrete, reinforcing steel, welding, excavation, painting, all incidentals pertaining hereto. The weight of steel posts shall be computed by taking the length of the post times the nominal weight per foot plus the weight of the break-away device, fuse device, and stub post as shown in the table.

GUIDE SIGNS— For Guide Sign placement and details, see Signing Standard Drawing No. 215.

APPROVED: H. J. ANDERSON - DIRECTOR OF HIGHWAYS
BY: Jack D. Bledsoe
ADMINISTRATOR - ENGINEERING DIVISION

SIGNING
STANDARD DRAWING NO. 223

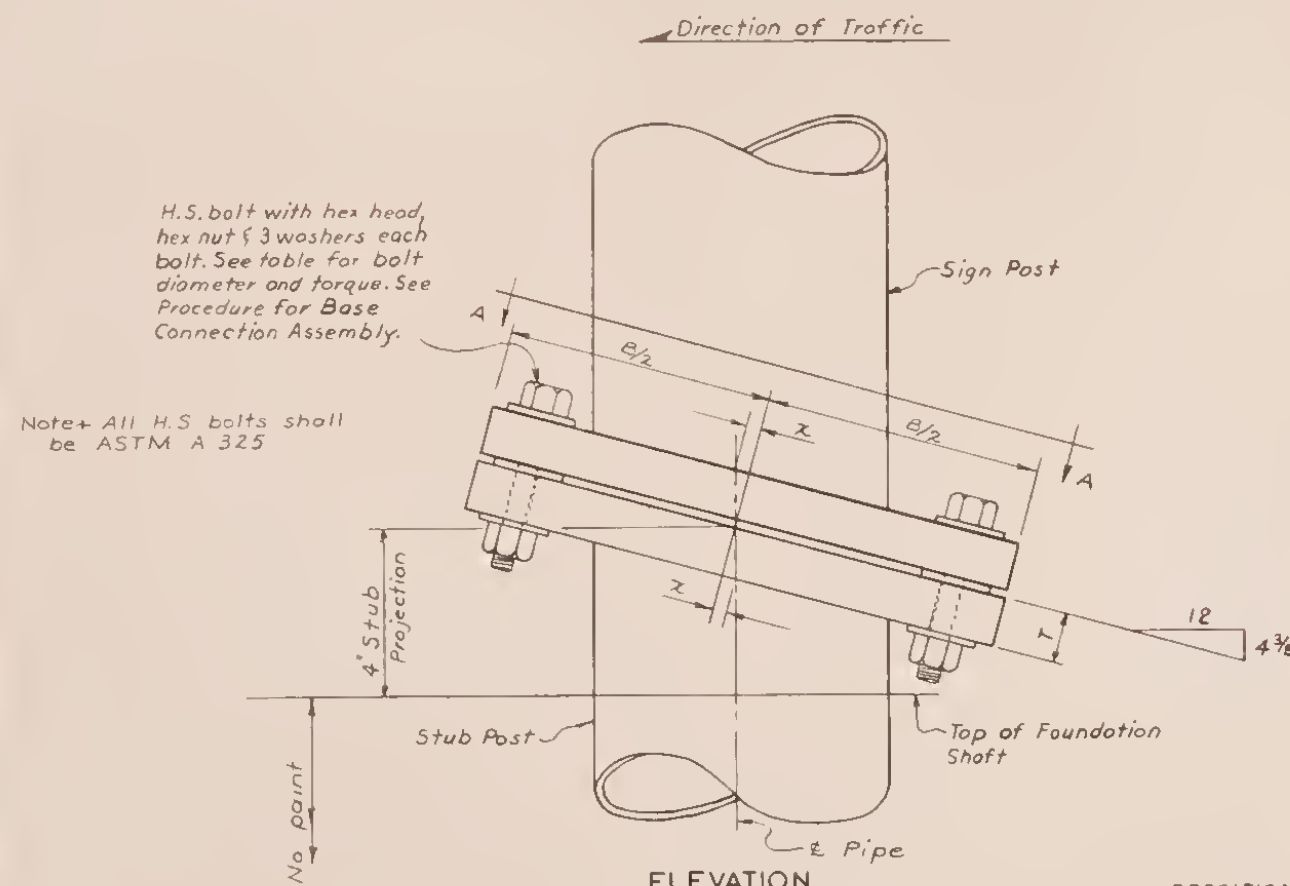
STATE OF MONTANA
DEPARTMENT OF HIGHWAYS
BREAK-AWAY & FOUNDATION DETAILS
FOR MULTIPLE GUIDE SIGN SUPPORTS

BRIDGE DRAWING NO. SN-2

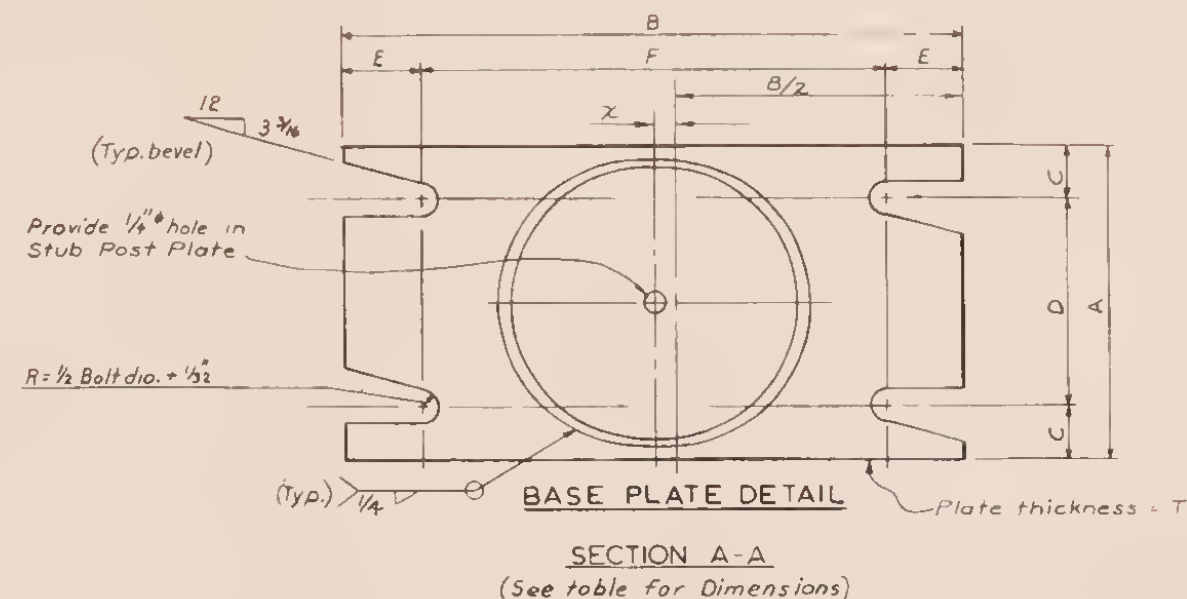
DRAWN BY	12-30-66	N H. R.
CHECKED BY:	1-3-67	W H L.

NOTE Friction fuse plates are not required with this detail.

APPROVED: Howard Stratton
SUPERVISOR - BRIDGE SECT



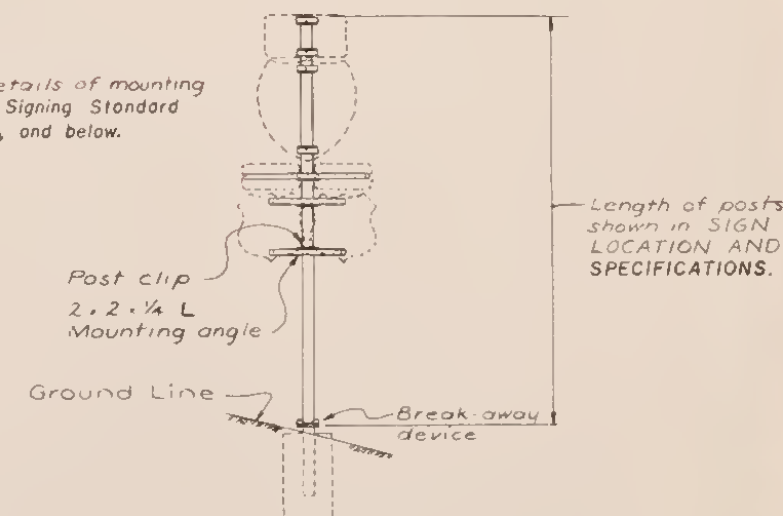
SIGN POST AND STUB POST DETAILS



PROCEDURE FOR BASE CONNECTION ASSEMBLY

- 1 Assemble post to stub with bolts and one flat washer between plates
- 2 Shim as required to plumb post.
- 3 Tighten bolts in a systematic order to the prescribed torque. (See Table).
- 4 Loosen each bolt and retighten to prescribed torque in the same order as original tightening. **DO NOT OVERTIGHTEN**
- 5 Burr threads at junction with nut using a center punch to prevent nut loosening.

Note - For details of mounting angles see Signing Standard Drawing No. 226, and below.



TYPICAL SIGN ELEVATION

SPECIFICATIONS - Montana State Highway Commission Standard Specifications for Road and Bridge Construction, 1970 Edition, and any amendments thereto, and Special Provisions shall govern unless otherwise noted. Design of posts and footings prepared in accordance with the A.A.S.H.O. Specifications for the Design and Construction of Structural Supports for Highway Signs, 1968 Edition.

STEEL PIPE - Steel pipe shall conform to the requirements of A.S.T.M. A-53, Type E or S, Grade B.

CONCRETE - Concrete shall be Class A or DD with wood float finish on top. Form top 12 inches of foundation.

STRUCTURAL STEEL - For requirements governing structural steels and their fabrication, see Section 4.3 of the Standard Specifications. To avoid oversight, these requirements shall be clearly noted on the shop drawings.

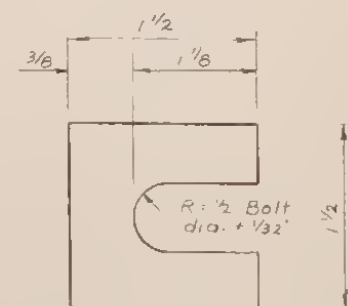
APPROVAL - Shop plans shall be approved by the State of Montana, Department of Highways before fabrication is begun.

PAYMENT - The unit price bid per pound for steel posts shall be full payment for the steel posts and footings complete in place, including all concrete, reinforcing steel, welding, excavation, and all incidentals pertaining thereto. The weight of steel posts shall be computed by taking the length of post times the nominal weight per foot plus the weight of the break-away devices and stub shown in the table plus the weight of post clips and mounting angles.

SIGNS - For sign placement and details see Signing Standard Drawings.

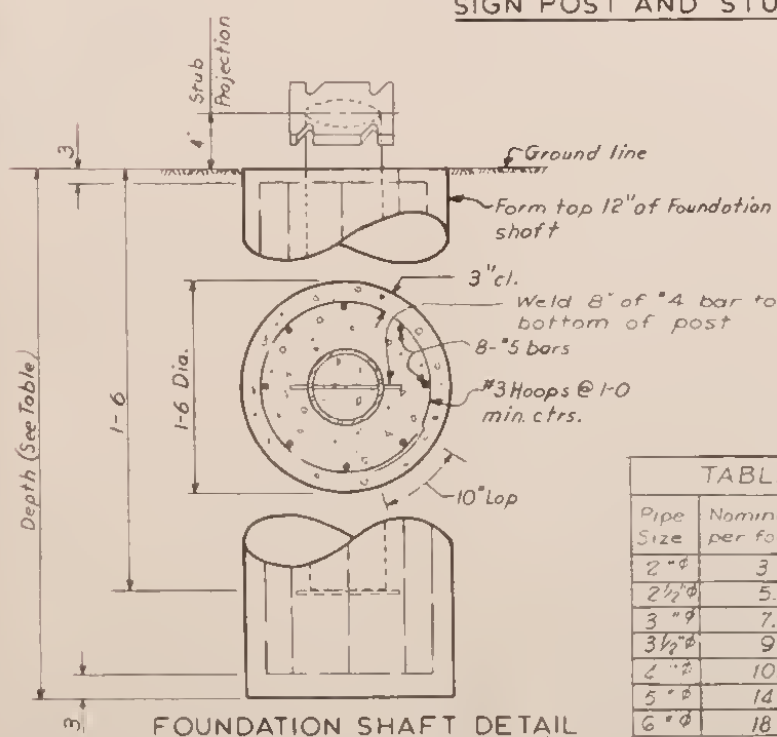
GALVANIZED PIPE - Shall be galvanized as per ASTM A-123.

PAINT - Except as otherwise approved by the Engineer, Structural Steel shall receive one (1) shop coat and one (1) field coat of red lead or basic lead-silico chromate and one (1) field coat of aluminum paint as specified in the Standard Specifications, on all surfaces not in contact with the concrete.



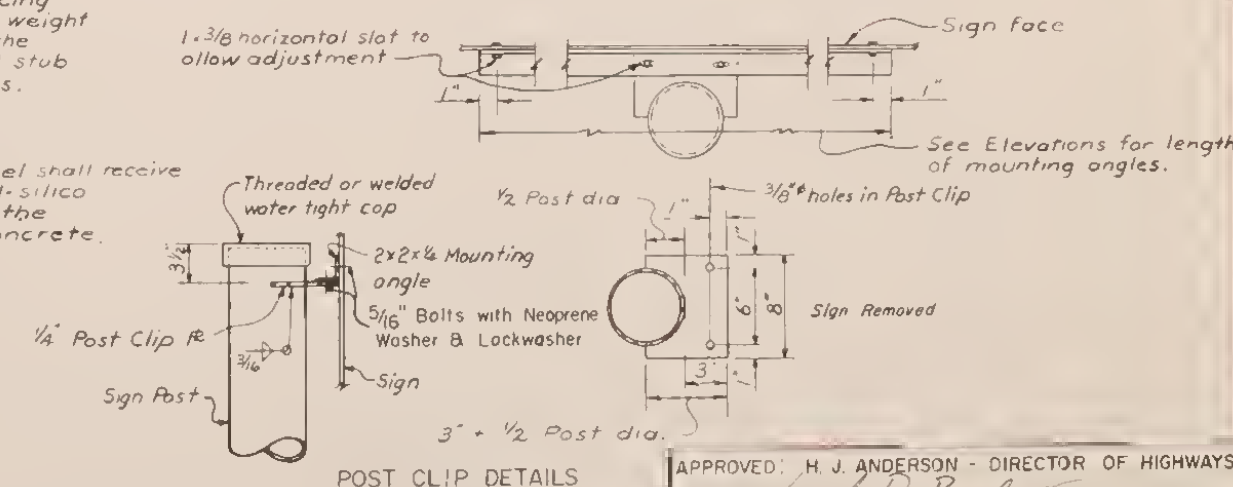
SHIM DETAIL

Note. EMBEDMENTS
2"Ø and 2-1/2"Ø posts shall have full 3'-0" footing depth embedment
3"Ø and larger posts shall have a 1' - 6" embedment.



Pipe Size	Nominal weight per foot of pipe	Weight of each break-away device and stub post
2"Ø	3.65	
2 1/2"Ø	5.79	
3"Ø	7.58	28.03
3 1/2"Ø	9.11	35.85
4"Ø	10.79	38.44
5"Ø	14.62	61.51
6"Ø	18.97	81.54

BASE CONNECTION DATA										FOUNDATION	
Nominal Pipe Size	Bolt Size & Torque	A	B	C	D	E	F	T	Z	Footing Diameter	Footing Depth
3"Ø	1/2"Ø x 2 1/2" Torque = 240 in. lbs.	4 1/2"	7 1/2"	1"	2 1/2"	3/4"	6"	3/4"	5/16"	1-6	3-0
3 1/2"Ø	5/8"Ø x 3 1/4" Torque = 450 in. lbs.	5 1/2"	8 1/2"	1"	3 1/2"	3/4"	7"	3/4"	5/16"	1-6	3-6
5"Ø	3/4"Ø x 3 1/2" Torque = 780 in. lbs.	6 1/2"	9 3/4"	1 1/4"	4"	7/8"	8"	1"	3/8"	1-6	3-6
6"Ø	7/8"Ø x 4" Torque = 1100 in. lbs.	7 1/2"	11 1/4"	1 1/2"	5"	1"	9 1/4"	1 1/4"	3/4"	1-6	3-6



APPROVED: H. J. ANDERSON - DIRECTOR OF HIGHWAYS
BY: *Jack P. Rasmussen*
ADMINISTRATOR - ENGINEERING DIVISION

SIGNING
STANDARD DRAWING NO. 224

STATE OF MONTANA
DEPARTMENT OF HIGHWAYS
BREAK-AWAY & FOUNDATION DETAILS
FOR SINGLE PIPE SIGN POST

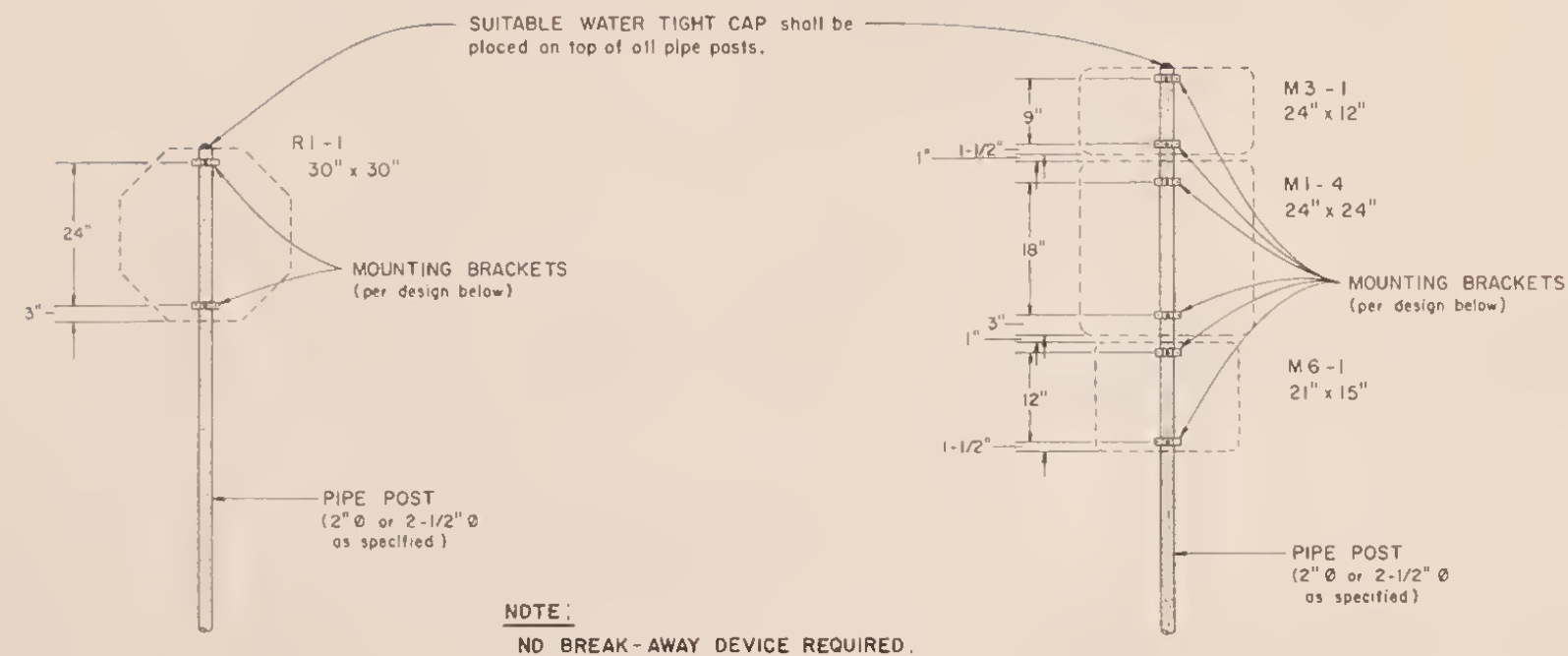
BRIDGE DRAWING NO. SN-1

DRAWN BY: 12-30-66 K E M
CHECKED BY: 1-3-67 W H L
REV: 6-8-73 / G E G

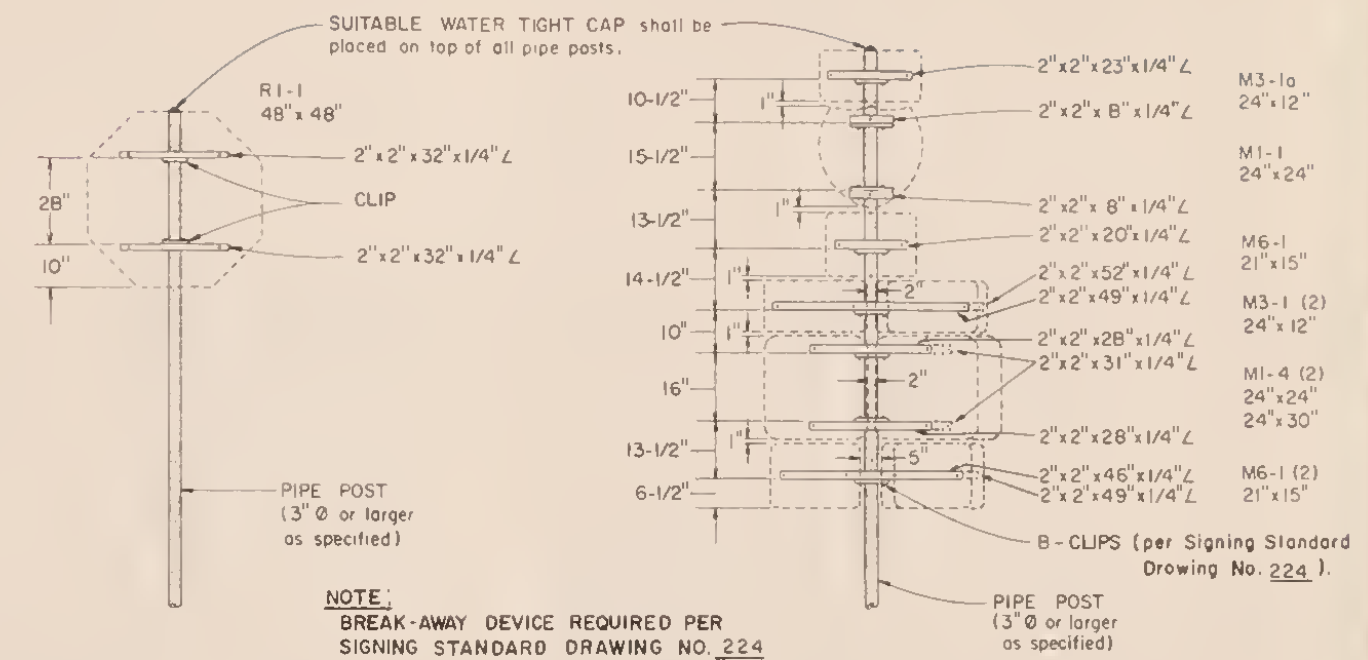
APPROVED: *Howard Stratton*
SUPERVISOR - BRIDGE SECT

TYPICAL PIPE POST MOUNTING DETAILS

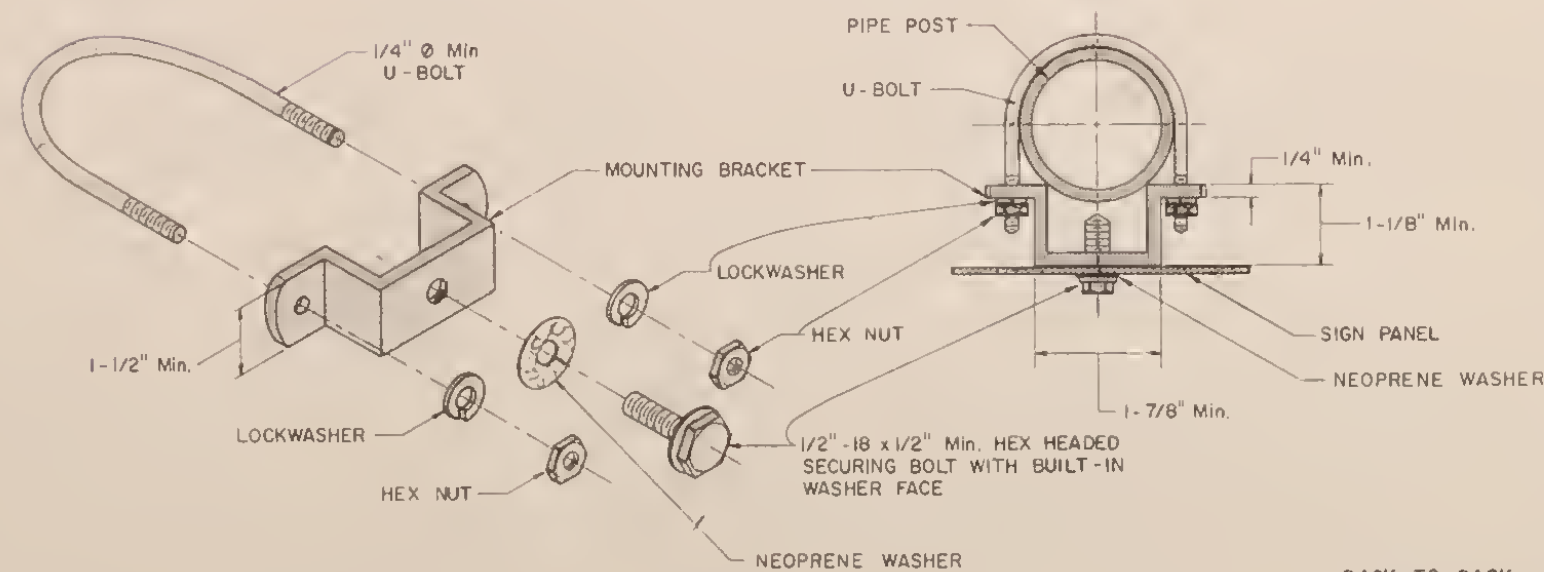
2" Ø AND 2-1/2" Ø PIPE



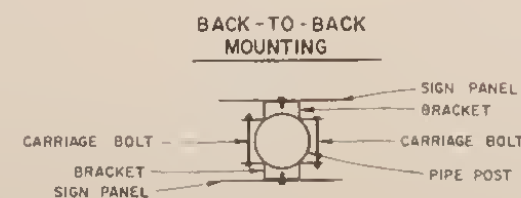
3" Ø AND LARGER PIPE



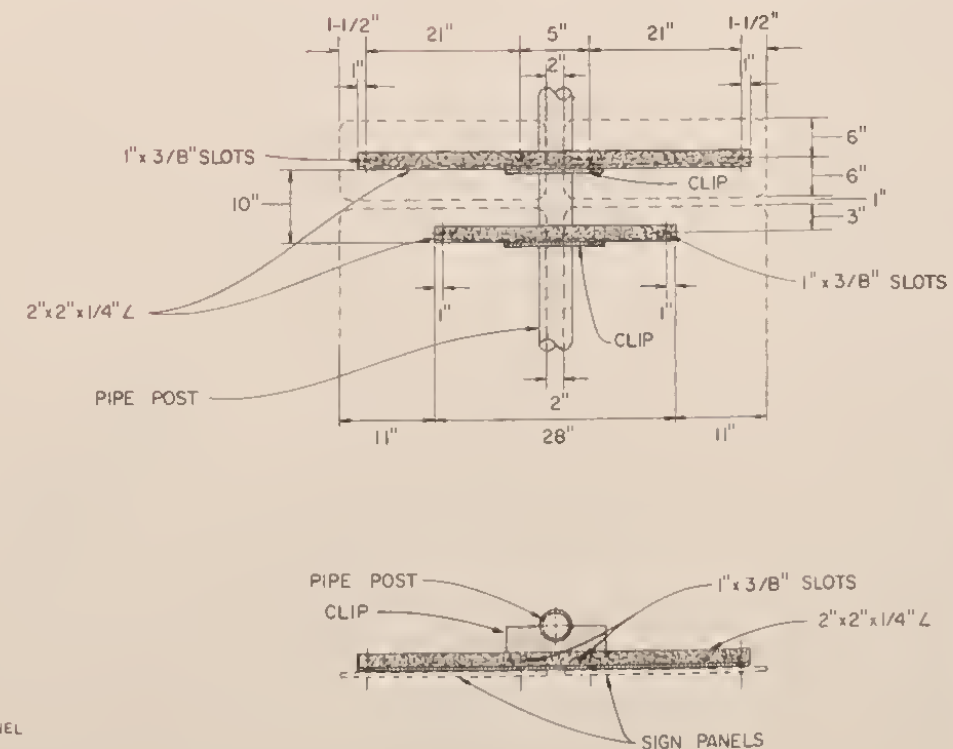
TYPICAL MOUNTING BRACKET DETAILS FOR 2" Ø AND 2-1/2" Ø PIPE



NOTE:
ALL METAL USED IN FABRICATION OF THIS TYPE MOUNTING BRACKET
SHALL BE OF STAINLESS STEEL OR CAOMIUM PLATED HI-CARBON
STEEL, OR GALVANIZED STEEL TO PREVENT UNDUE CORROSION
AND STREAKING.
FOR MULTIPLE BACK-TO-BACK SIGN MOUNTING, TWO BRACKETS USING
TWO 2-1/2" x 1/4" CARRIAGE BOLTS IN PLACE OF THE "U" BOLT WILL
BE REQUIRED. (see detail on right)



TYPICAL MOUNTING DETAILS FOR 3" Ø AND LARGER PIPE



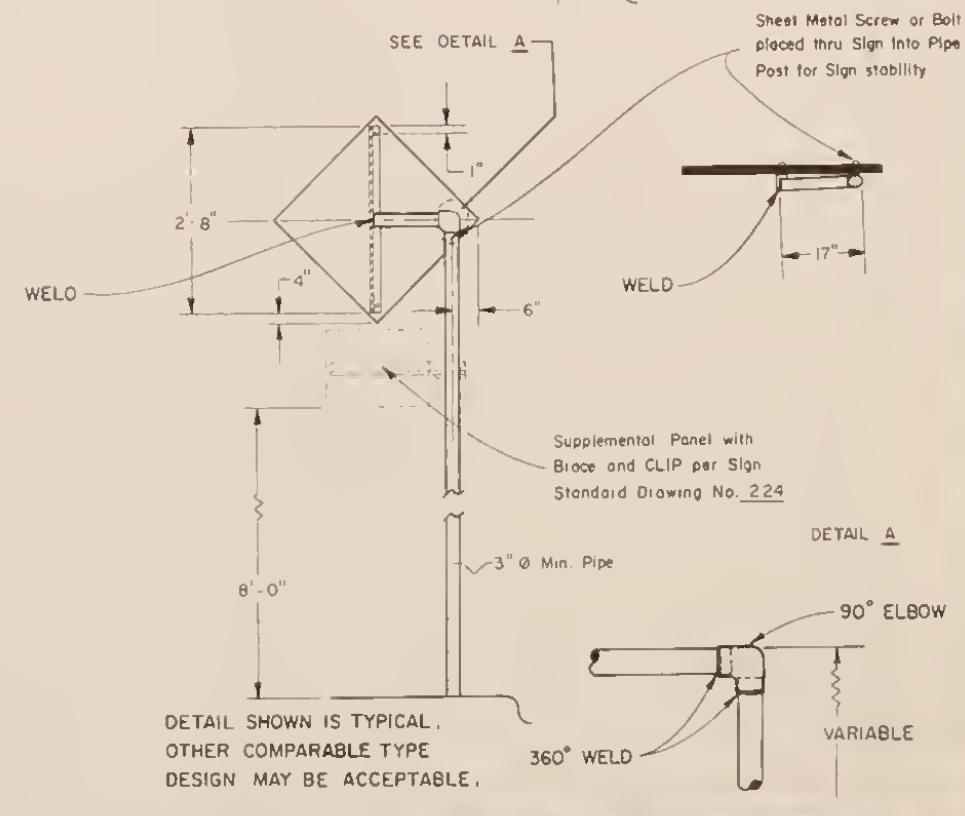
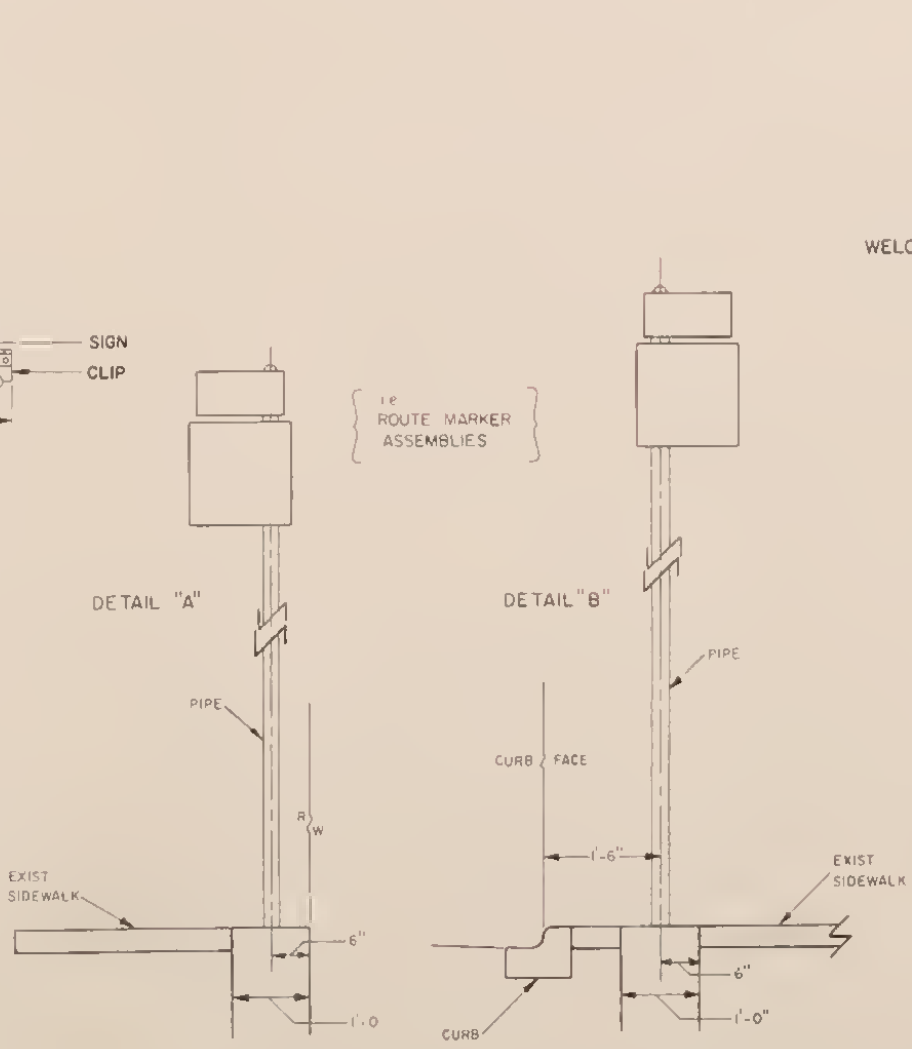
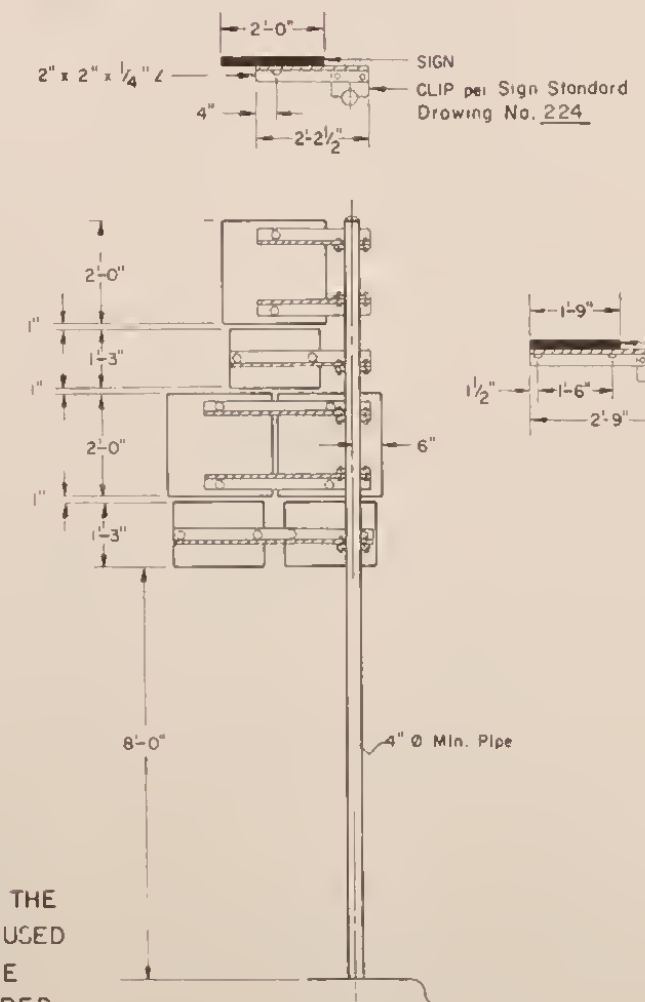
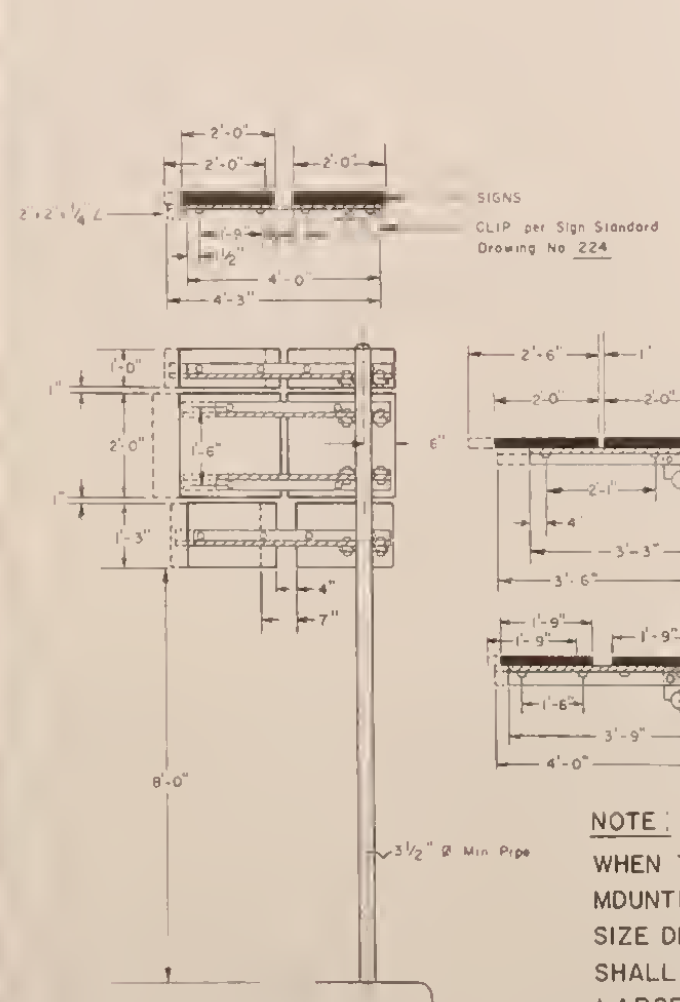
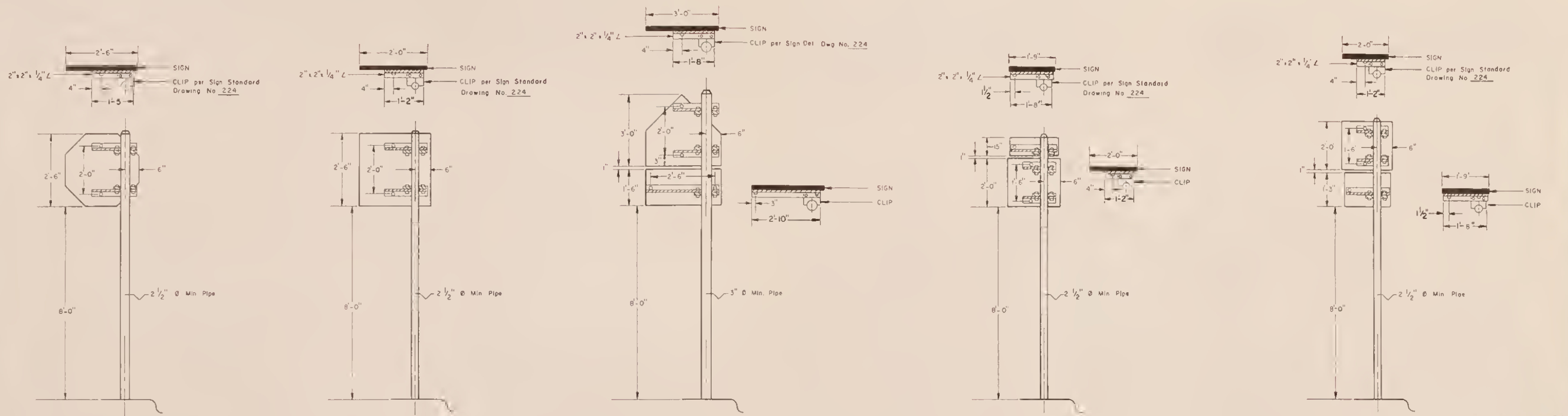
NOTE:
ALL MATERIAL USED IN FABRICATION OF THIS TYPE MOUNTING
SHALL CONFORM TO THE STANDORD SPECIFICATIONS.
THE LENGTH OF EACH L BRACKET SHALL DEPEND ON THE
MOUNTING ASSEMBLY AND HOLE SPACING OF EACH SIGN.
THE ASSEMBLIES SHOWN ARE TYPICAL INSTALLATIONS. ALL
SIMILAR ASSEMBLIES SHALL BE ERECTED IN A LIKE MANNER.

APPROVED: H. J. ANDERSON - DIRECTOR OF HIGHWAYS
BY: *Jack B. B...*
ADMINISTRATOR - ENGINEERING DIVISION

SIGNING
STANDARD DRAWING NO. 226

STATE OF MONTANA
DEPARTMENT OF HIGHWAYS
TYPICAL PIPE POST
MOUNTING DETAILS

DRAWN BY:	7-9-73	G. E. G.
CHECKED BY:	7-20-73	C. H. L.



NOTE:
WHEN THE OFF-SET TYPE MOUNTING IS NECESSARY, THE SIZE OF THE POST TO BE USED SHALL BE THE NEXT SIZE LARGER THAN IS REQUIRED FOR A STANDARD TYPE MOUNTING.

NOTE: Typical back bracing to be used with the larger 24" x 30" three digit route markers. The larger route marker & back bracing is shown with a broken line.

NOTE: The standard type mounting should be used behind sidewalks if R/W limits permit. If R/W doesn't permit, then detail "A" above should be used behind sidewalks or in the sidewalk next to buildings. If conditions are such that the sign cannot be mounted on the backside of the sidewalk then detail "B" above should be used.

APPROVED: H. J. ANDERSON - DIRECTOR OF HIGHWAYS
BY: *Jack R. Borchert*
ADMINISTRATOR - ENGINEERING DIVISION

SIGNING
STANDARD DRAWING NO. 227

STATE OF MONTANA
DEPARTMENT OF HIGHWAYS
OFF-SET TYPE SIGN SUPPORT DETAILS
FOR SIDEWALK AREAS

DRAWN BY:	3-30-73	G. E. G.
CHECKED BY:	3-30-73	GAJ

REV: 8-30-73

NOTES:

1. All Timber Poles shall conform to the 1970 State of Montana - Department of Highways "Standard Specifications."
2. All Timber Poles shall be full pressure treated as per the "Standard Specifications."
3. All cutting, trimming, and boring of Treated Poles shall conform and be in accordance with the "Standard Specifications."
4. All Poles shall be joined on the sign side o mnum as shown in the Table below for 1/2 the length of each pole as shown.
5. Break Away Details shall be standard for all Timber Wood

- Poles listed in the lower left hand corner Table below, either on single or multiple sign supports.
6. All Back Bracing material shall be of Standard No. 2 or better Grade S 4 S lumber, and shall meet all spec's listed in Sect. M-320.01 of the "Standard Specifications."
 7. All bolts, nuts, and washers shall be of Aluminum, Stainless Steel, or Cadmium Plated Steel material.
 8. A 2"x4"x12" board shall be attached 12" from the bottom of the Pole. Attachment shall be made by driving two nails (spikes) through the 2"x4" and into the Pole. The 2"x4" shall be treated according to the Standard Specifications. The cost for all material and labor to accomplish this work shall be included in the Item -- POLES - TREATED TIMBER - BARN of the contract.

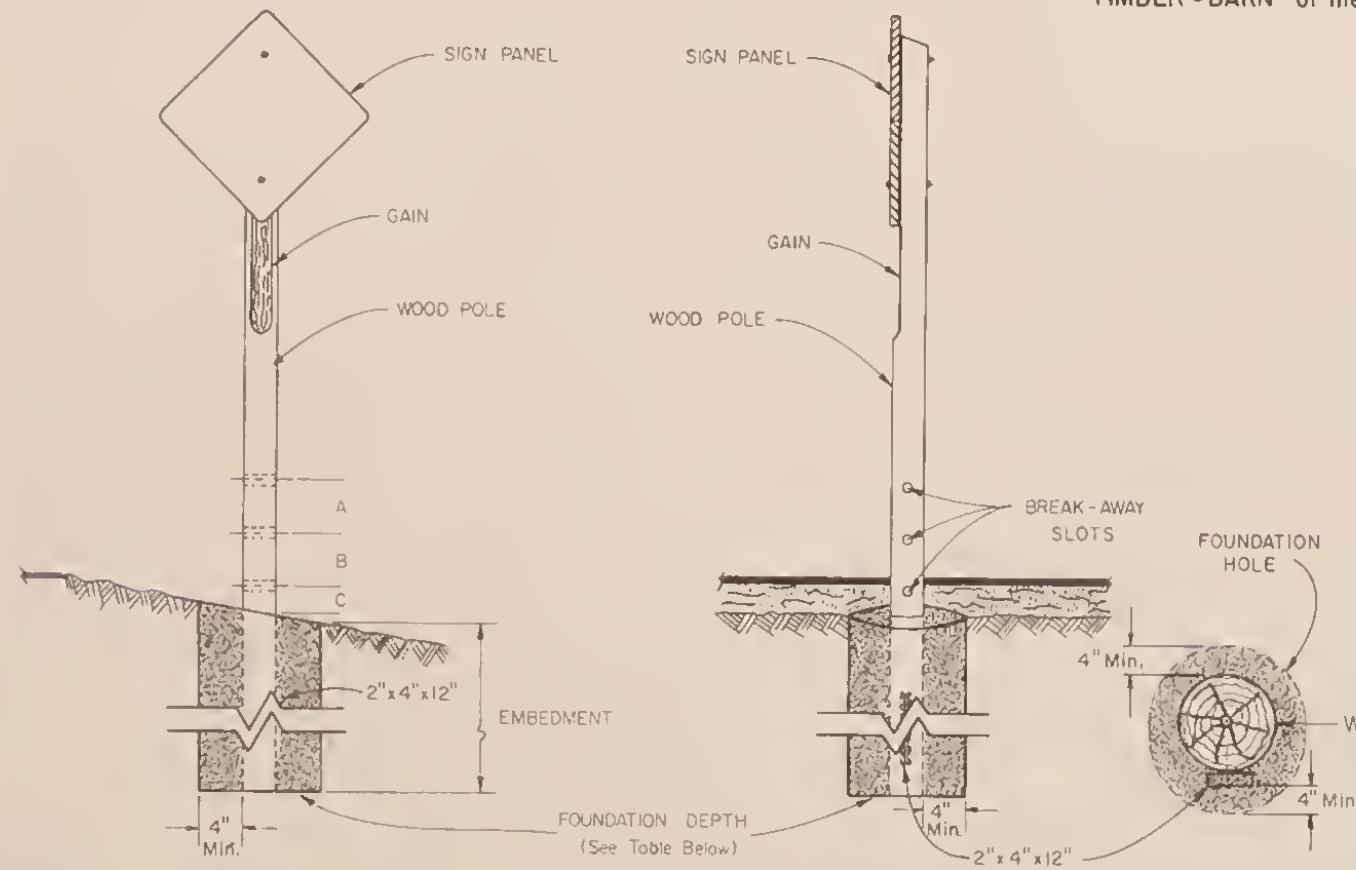
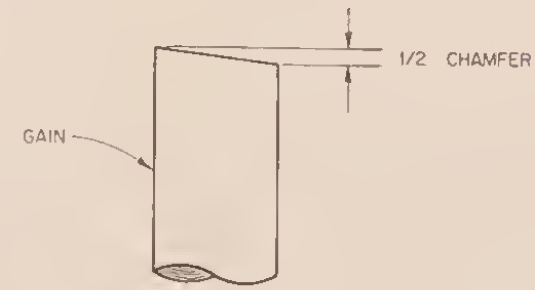


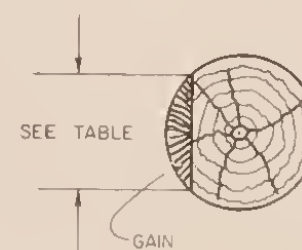
TABLE OF BREAK-AWAY SLOT DIAMETERS, EMBEDMENTS & GAINS					
POLE SIZE	A	B	C	SLOT DIA	EMBEDMENT
3" TOP Ø	—	—	—	—	3' - 0"
4" TOP Ø	—	—	—	—	3' - 0"
5" TOP Ø	—	1'	6"	2"	3' - 0"
6" TOP Ø	—	1'	6"	2"	3' - 6"
CLASS 4	—	1'	6"	2"	4' - 0"
CLASS 3	—	1'	6"	2-1/2"	4' - 0"
CLASS 2	6"	6"	4"	2"	6' - 0"
CLASS 1	6"	6"	4"	2-1/2"	6' - 0"

BREAK - AWAY DETAIL

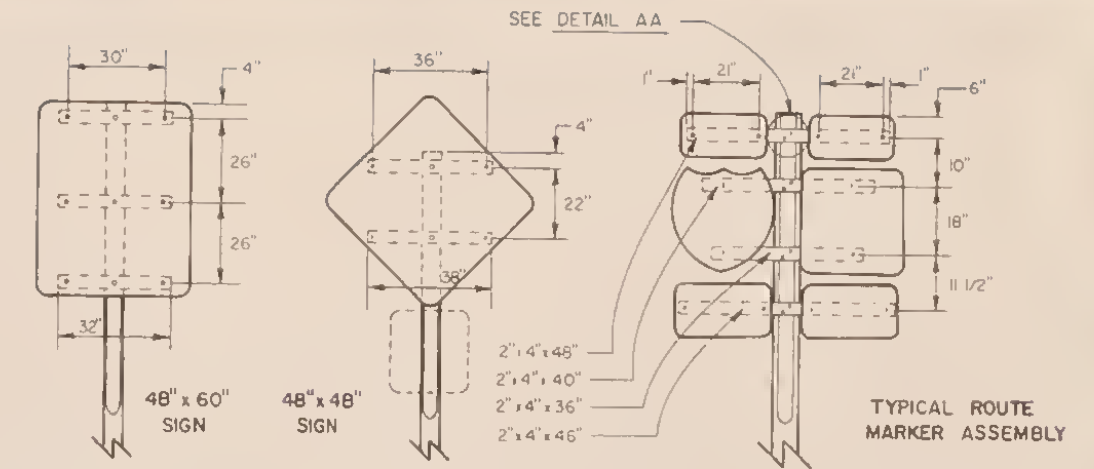
TREATED WOOD POLE, SINGLE OR MULTIPLE SIGN SUPPORT



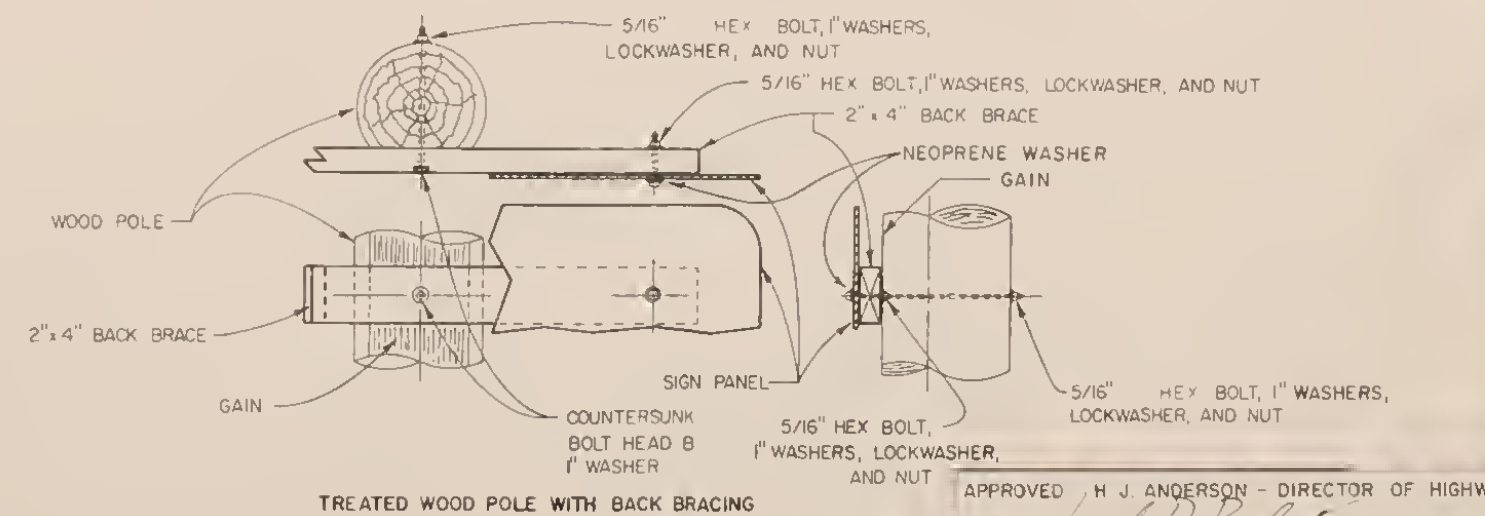
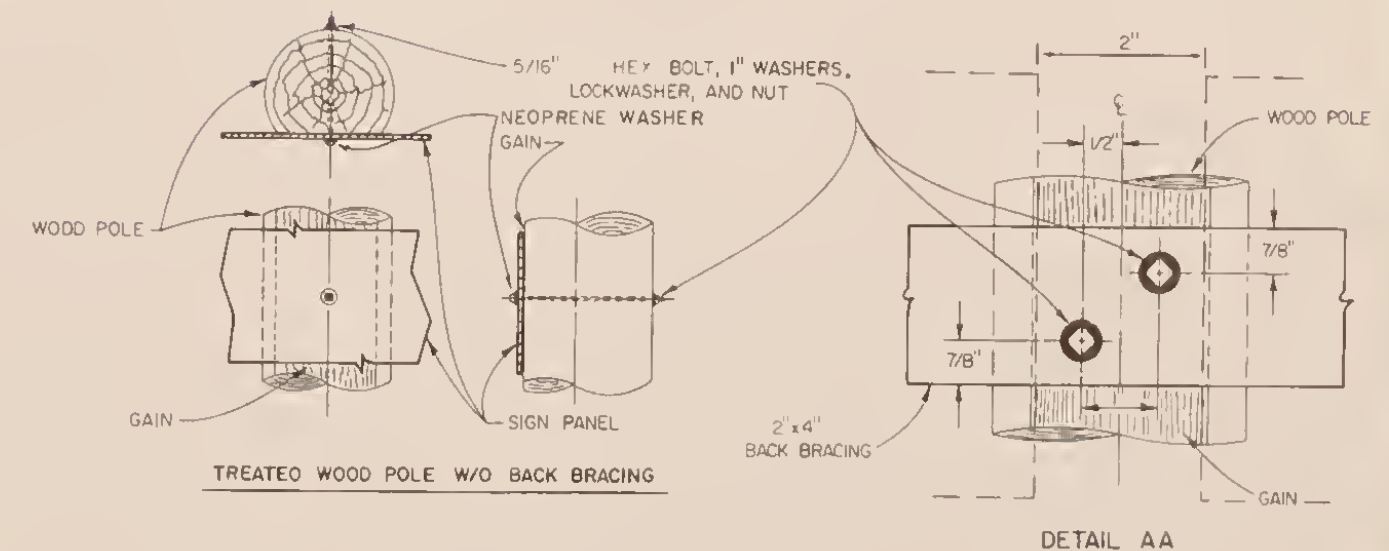
TOP END TREATMENT



GAIN DETAIL



TYPICAL SIGN MOUNTINGS



APPROVED H. J. ANDERSON - DIRECTOR OF HIGHWAYS
BY *[Signature]*
ADMINISTRATOR - ENGINEERING DIVISION

SIGNING
STANDARD DRAWING NO. 228

STATE OF MONTANA
DEPARTMENT OF HIGHWAYS
TREATED TIMBER POLE
SIGN SUPPORT DETAILS

DRAWN BY: 3-30-73 G. E. G.
CHECKED BY: 3-30-73 G. A. J.
REV. 4-23-73

R 4-14



R 4-14
36" x 36"
Margin = 5/8"
Border = 7/8"
Corner Radius = 2-1/4"
Black Legend and Border on a
Reflectorized White Background.

R 10-9a



R 10-9a
24" x 30"
Margin = 3/8"
Border = 5/8"
Corner Radius = 1-1/2"
Black Legend and Border on a
Reflectorized White Background.

R 10-11



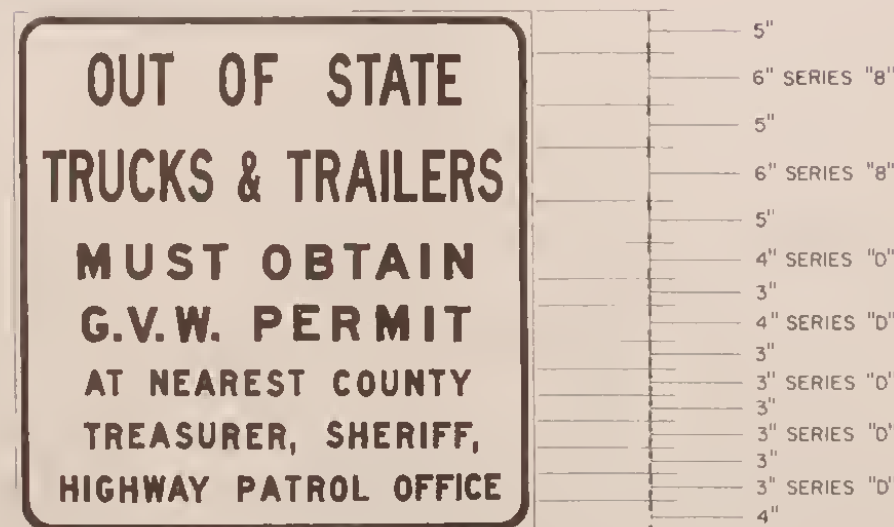
R 10-11
24" x 30"
Margin = 3/8"
Border = 5/8"
Corner Radius = 1-1/2"
Black Legend and Border on a Reflectorized White
upper portion, and a Reflectorized White Legend on
a Black Background lower portion.

R 12-5



R 12-5
24" x 30"
Margin = 3/8"
Border = 5/8"
Corner Radius = 1-1/2"
Black Legend and Border on a
Reflectorized White Background.

R 13-2



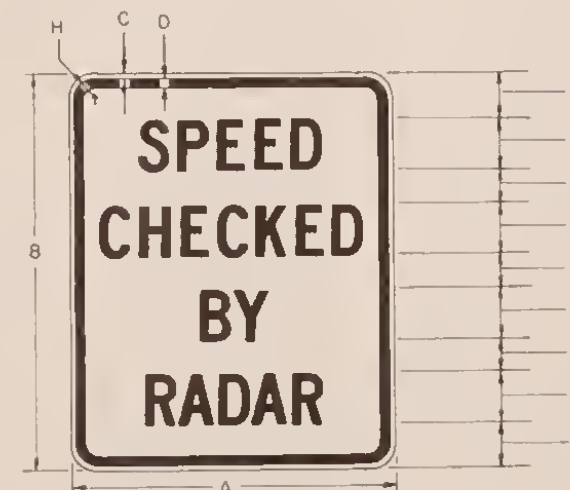
R 13-2
60" x 60"
Margin = 1/2"
Border = 1"
Corner Radius = 3"
Black Legend and Border on a
Reflectorized White Background.

R 4-9



R 4-9
48" x 48"
Margin = 3/4"
Border = 1-1/4"
Corner Radius = 3"
Black Legend and Border on a
Reflectorized White Background.

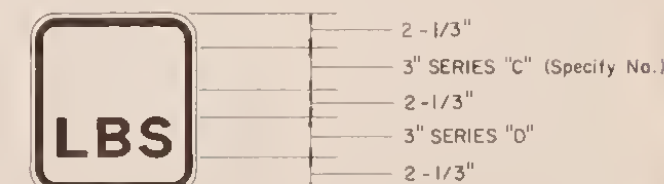
R 2-11



R 2-11 DIMENSIONS							
A	B	C	D	E	F	G	H
24"	30"	3/8"	5/8"	3-1/4"	4" C	2-1/2"	1-1/2"
48"	60"	3/4"	7/8"	6-1/2"	8" C	5"	3"

Black Legend and Border on a
Reflectorized White Background

R 12-5 P



R 12-5 P
13" x 13"
Margin = 3/8"
Border = 5/8"
Corner Radius = 1-1/2"
Black Legend and Border on a
Reflectorized White Background.

APPROVED: H. J. ANDERSON - DIRECTOR OF HIGHWAYS

BY: *Jack P. Baskin*
ADMINISTRATOR - ENGINEERING DIVISION

SIGNING
STANDARD DRAWING NO. 232

STATE OF MONTANA
DEPARTMENT OF HIGHWAYS
SPECIAL DESIGN REGULATORY SIGNS

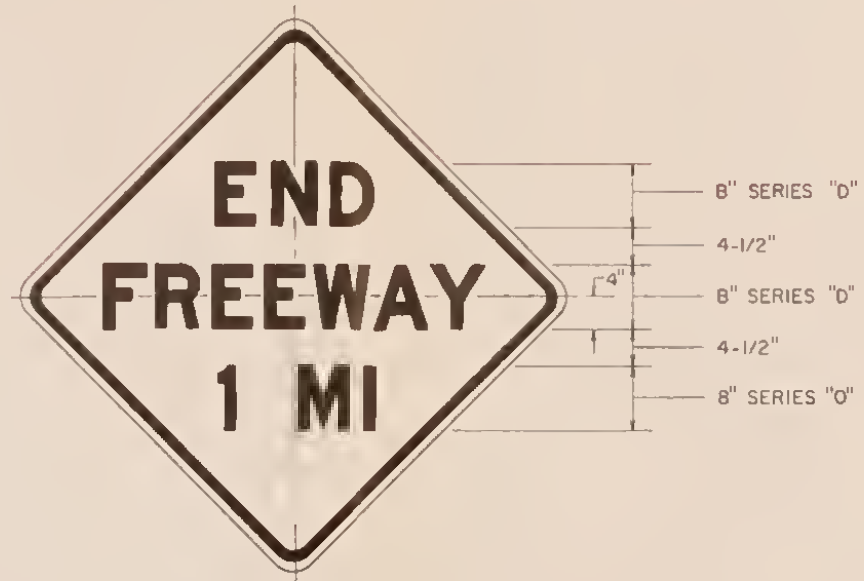
DRAWN BY:	5-15-73	G. E. G.
CHECKED BY:	5-16-73	C. H. L.

W 6 - 4 a



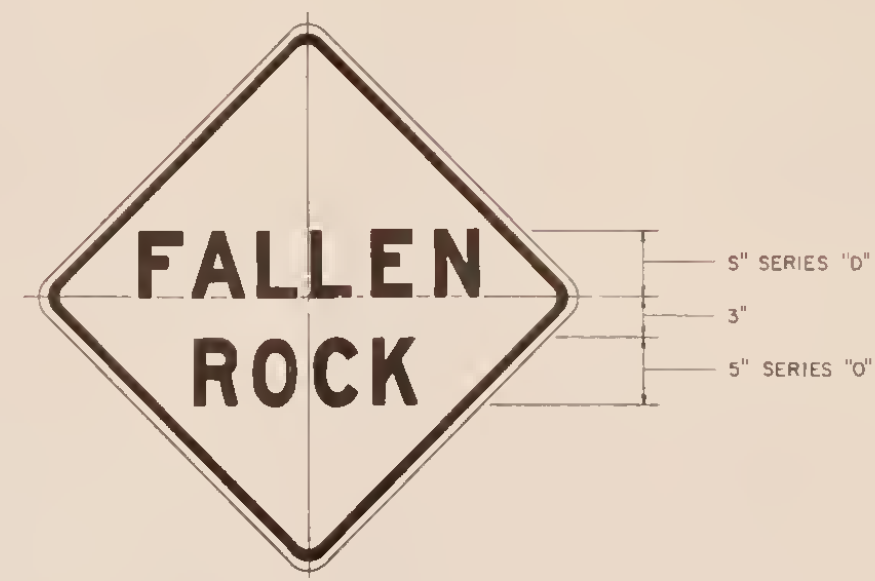
W 6 - 4 a
48" x 48"
Margin = 3/4"
Border = 1-1/4"
Corner Radius = 3"
Black Legend and Border on a
Reflectorized Yellow Background.

W 6 - 4 b



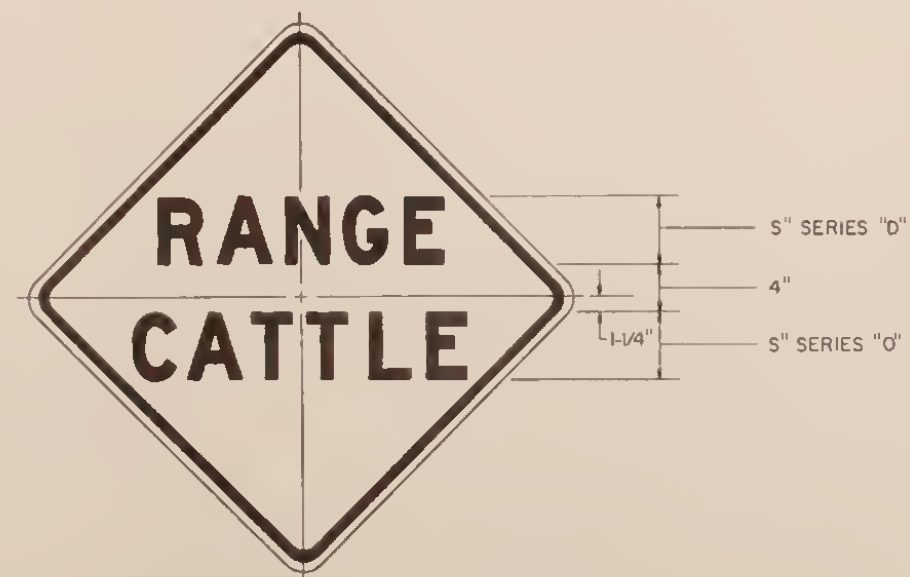
W 6 - 4 b
48" x 48"
Margin = 3/4"
Border = 1-1/4"
Corner Radius = 3"
Black Legend and Border on a
Reflectorized Yellow Background.

W 8 - 9



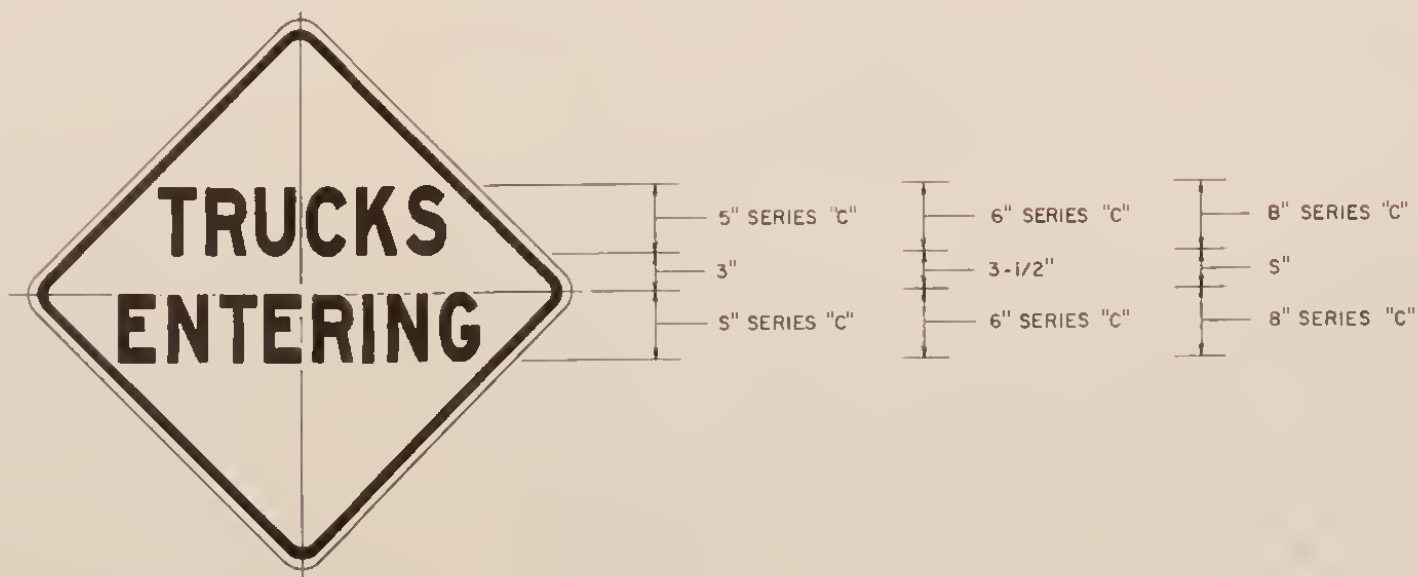
W 8 - 9
30" x 30"
Margin = 1/2"
Border = 3/4"
Corner Radius = 1-7/8"
Black Legend and Border on a
Reflectorized Yellow Background.

W 11 - 7



W 11 - 7
30" x 30"
Margin = 1/2"
Border = 3/4"
Corner Radius = 1-7/8"
Black Legend and Border on a
Reflectorized Yellow Background.

W 11 - 8



W 11 - 8
30" x 30"
Margin = 1/2"
Border = 3/4"
Corner Radius = 1-7/8"

Black Legend and Border on a
Reflectorized Yellow Background.

W 11 - B
36" x 36"
Margin = 5/8"
Border = 7/8"
Corner Radius = 2-1/4"

W 11 - B
48" x 48"
Margin = 3/4"
Border = 1-1/4"
Corner Radius = 3"

APPROVED: H. J. ANDERSON - DIRECTOR OF HIGHWAYS

BY: *Jack P. Bredt*
ADMINISTRATOR - ENGINEERING DIVISION

SIGNING
STANDARD DRAWING NO. 233

STATE OF MONTANA
DEPARTMENT OF HIGHWAYS
SPECIAL DESIGN WARNING SIGNS

DRAWN BY:	S-3D-73	G. E. G.
CHECKED BY:	S-31-73	C. H. L.

PANELS

FOR ROUTE MARKER ASSEMBLY USE

M1 - 6



M1 - 6
24" x 24"
Margin = None
Border = 1-1/2"
Corner Radius = 1-1/2"
Black Legend and Border on a
Reflectorized White Background.



M1 - 6
30" x 24"
Margin = None
Border = 1-1/2"
Corner Radius = 1-1/2"
Black Legend and Border on a
Reflectorized White Background.

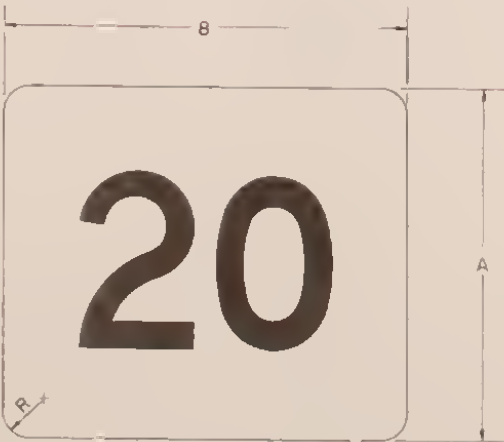
M1 - 8



M1 - 8
24" x 24"
Margin = None
Border = See design above.
Corner Radius = 1-1/2"
Black Legend and Border on a
Reflectorized White Background.

SHIELDS

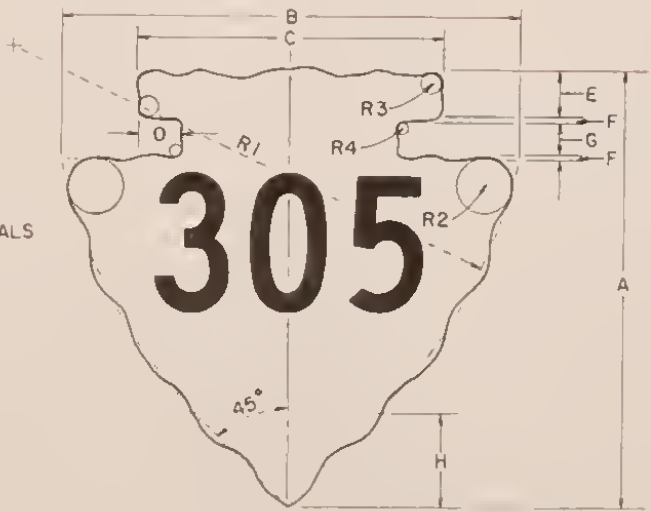
FOR USE ON GUIDE SIGNS



SERIES "D" NUMERALS

	10" NUM.	12" NUM.	15" NUM.
A	21"	21"	27"
B	24"	30"	36"
R	1-1/2"	1-1/2"	2"

Black Legend on a Reflectorized
White Background with no Border.



SERIES "C" NUMERALS

NUMERAL SIZE	A	B	C	D	E	F	G	H	R1	R2	R3	R4
8" "C"	26"	28"	18-1/2"	2-5/8"	3"	5/16"	2"	5-1/2"	32"	1-3/4"	5/8"	5/16"
10" "C"	32"	34"	22-1/2"	3-1/4"	3-5/8"	3/8"	2-1/2"	6-3/4"	38-1/2"	2"	3/4"	3/8"
12" "C"	40"	42"	28"	4"	4-1/2"	1/2"	3"	8-7/16"	48"	2-1/2"	1"	1/2"

Black Legend on a Reflectorized White Background.
+ To be used with standard 24" U. S. Shield.
+ + To be used with standard 30" B 36" U. S. Shield.
+ + + To be used with standard 42" U. S. Shield or all independent use.

NOTE:

All numerals used on Panels and
Shields are, and shall be, optically
spaced about vertical centerline.

APPROVED: H. J. ANDERSON - DIRECTOR OF HIGHWAYS
BY: *Jack R. Berber*
ADMINISTRATOR - ENGINEERING DIVISION

SIGNING
STANDARD DRAWING NO. 234

STATE OF MONTANA
DEPARTMENT OF HIGHWAYS
SPECIAL DESIGN PRIMARY &
SECONDARY ROUTE MARKER
PANELS AND SHIELDS

DRAWN BY: 5-21-73 G. E. G.
CHECKED BY: 5-22-73 C. H. L.

I - 1

10" U.C.
10" U.C.
10" NUMERAL
15" FRACTION
10" U.C.

12' - 0" x 5' - 6"

I - 1a

10" U.C.
10" U.C.
10" U.C.

12' - 0" x 5' - 6"

I - 2

10" U.C.
10" U.C.

12' - 0" x 4' - 0"

I - 2a

10" U.C.

11' - 0" x 2' - 6"

I - 3

12" U.C.
15" NUMERAL
12" U.C.

12' - 0" x 5' - 0"

I - 4

12" U.C.
12" U.C.

12' - 0" x 5' - 0"

I - 5

12" U.C.
12" U.C.
TYPE "8" ARROW
21 7/8" x 25" @ 45°

6' - 6" x 6' - 6"

I - 6

8" U.C.
8" NUMERALS
8" U.C.

10' - 0" x 3' - 0"

I - 6a

8" U.C.
8" TYPE "8" NUMERALS
8" U.C.

11' - 6" x 3' - 0"

I - 7

10" U.C.
10" U.C.
10" U.C.
10" U.C.

12' - 0" x 8' - 0"

I - 7a

10" U.C.
10" U.C.
10" U.C.
10" U.C.

12' - 0" x 7' - 0"

I - 8

6" U.C.

7' - 0" x 1' - 6"

N6 - 4b

13.3" U.C.
10" L.C.
10" L.C.
13.3" U.C.
10" L.C.

9' - 6" x 7' - 0"

D8 - 1

12" U.C.
12" U.C.
12" NUMERAL
10" U.C.

9' - 0" x 6' - 0"

D8 - 2

10" U.C.
10" U.C.
10" U.C.
10" U.C.

12' - 0" x 8' - 0"

Lower portion to be designed by the Electrical Section (see Plans).

D8 - 3

10" U.C.
10" U.C.
TYPE "8" ARROW
14 1/4" x 17 1/4" @ 45°

8' - 0" x 6' - 0"

R13 - 1

10" U.C.
10" U.C.
10" U.C.
10" U.C.

11' - 0" x 7' - 0"

NOTES

1. The I-1, I-1a, I-2, I-2a, I-7, and I-7a signs shall have Series "E" Modified Type "B" Removable ReflectORIZED White Legends on ReflectORIZED Blue Backgrounds.
2. The I-3, I-4, I-5, I-6, I-6a, and I-8 signs shall have Series "E" Modified Type "C" Direct Applied ReflectORIZED White Legends on ReflectORIZED Blue Backgrounds.
3. The D8-1, D8-2, D8-3, and N6-4b signs shall have Series "E" Modified Type "C" Direct Applied ReflectORIZED White Legends on ReflectORIZED Green Backgrounds.
4. The R13-1 sign shall have a Series "E" Modified Type "C" Direct Applied ReflectORIZED White Legend on a NonreflectORIZED Black Background.
5. Before Fabricating signs, Shop Drawings shall be submitted as per the Special Provisions of the Project.

APPROVED: H. J. ANDERSON - DIRECTOR OF HIGHWAYS
BY: *Jack R. Beckel*
ADMINISTRATOR - ENGINEERING DIVISION

SIGNING
STANDARD DRAWING NO. 235

STATE OF MONTANA
DEPARTMENT OF HIGHWAYS
LAYOUT DETAILS FOR STANOARO
INFORMATION SIGNS ON
INTERSTATE HIGHWAYS

DRAWN BY:	8-2-73	G. E. G.
CHECKED BY:	8-9-73	T. A. H.

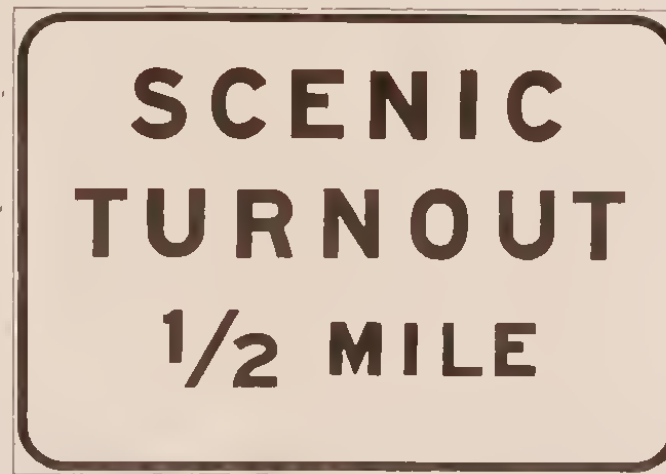
8"
8" SERIES "E"
7"
8"
5"



D5-1 8'-0" x 3'-0"
B" SERIES "E" NUMERAL

6" RADIUS

8"
8" SERIES "E"
7"
8" SERIES "E"
6"
9"
8"



06-4 6'-6" x 4'-6"

6" RADIUS

6"
SERIES "E"

6"
6" SERIES "D"
5"
6" SERIES "D"
5"
9"
5"



D5-5B 4'-0" x 3'-6"

6" RADIUS

6" SERIES "D"

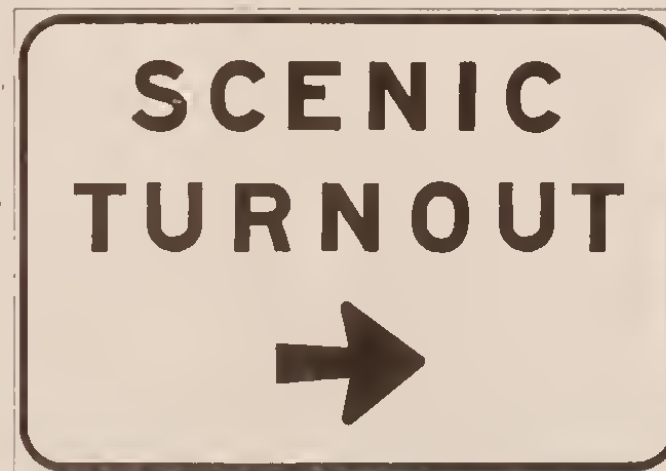
6.75
8" SERIES "E"
6.50
8" SERIES "E"
6.75



14 25"

D5-2R 6'-6" x 3'-0"
D5-2L 6'-6" x 3'-0" REVERSE ARROW
TYPE "8" ARROW 14 25" x 17 25"

6"
8" SERIES "E"
6"
8" SERIES "E"
5.75
14 25
6"



D6-6R 6'-6" x 4'-6"
D6-6L 6'-6" x 4'-6" REVERSE ARROW
TYPE "8" ARROW 14 25" x 17 25"

6"
6" SERIES "D"
5"
6" SERIES "D"
5.28
8 44
5.28



D5-5R 4'-0" x 3'-6"
D5-5L 4'-0" x 3'-6" REVERSE ARROW
TYPE "8" ARROW 8 44" x 9 56"

NOTE

HISTORIC POINT SIGNS SHALL HAVE BROWN BACKGROUND WITH WHITE LEGEND
ALL OTHERS SHALL HAVE BLUE BACKGROUND WITH WHITE LEGEND.
ALL BACKGROUND AND LEGEND SHALL BE REFLECTORIZED.

6"
6" SERIES "D"
5"
6" SERIES "D"
5"
9"
5"



D9-4 3'-6" x 3'-6"

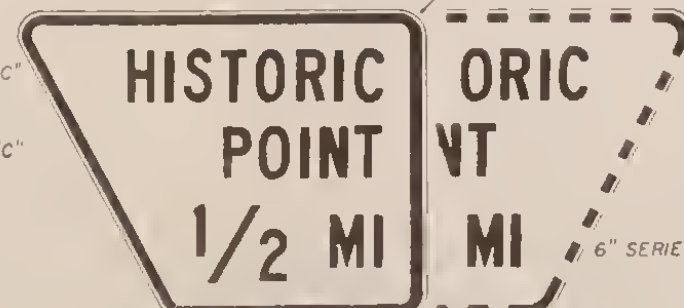
6" RADIUS

6"
6" SERIES "D"
5"
6" SERIES "D"
5.28
8 44
5.28



D9-6R 3'-6" x 3'-6"
D9-6L 3'-6" x 3'-6" REVERSE ARROW
TYPE "8" ARROW 8 44" x 9 56"

4 50"
6" SERIES "C"
3"
6" SERIES "C"
3"
9"
4 50"



D7-3L 4'-0" x 3'-0" x 2'-6"
D7-3R 4'-0" x 3'-0" x 2'-6" REVERSE PANEL

3" RADIUS

6" SERIES "C"



D7-4L 4'-0" x 3'-0" x 2'-6"
D7-4R 4'-0" x 3'-0" x 2'-6" REVERSE PANEL AND ARROW
TYPE "8" ARROW 8 44" x 9 56"

6" SERIES "C"

6" SERIES "C"

8 44

APPROVED: H. J. ANDERSON - DIRECTOR OF HIGHWAYS

BY: *[Signature]*
ADMINISTRATOR - ENGINEERING DIVISION

SIGNING
STANDARD DRAWING NO. 236

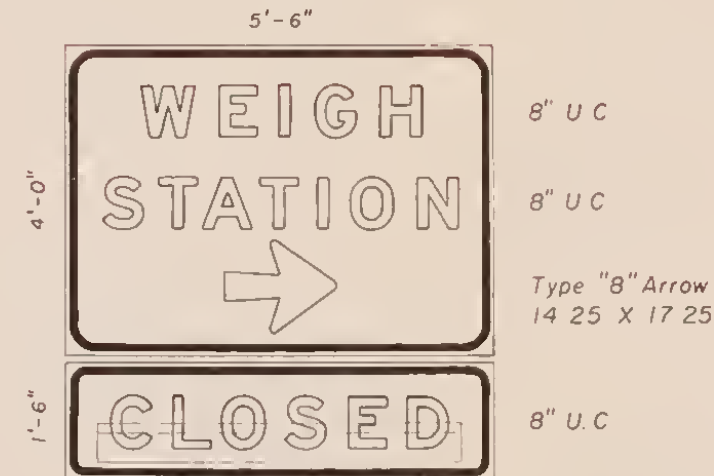
STATE OF MONTANA
DEPARTMENT OF HIGHWAYS
LAYOUT DETAILS FOR STANDARD
INFORMATION SIGNS ON
PRIMARY & SECONDARY HIGHWAYS

DRAWN BY: 3-30-73 G. E. G.
CHECKED BY: 3-30-73 C. H. L.

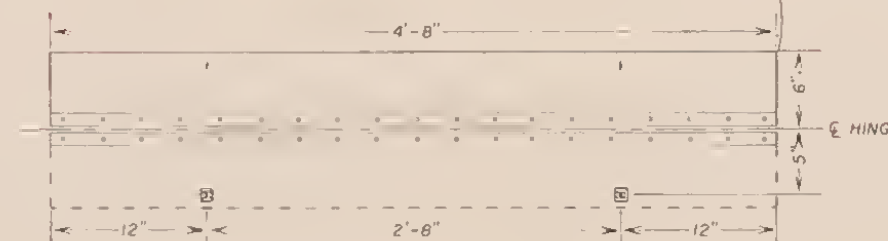
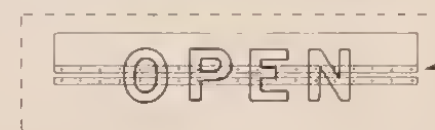
D8-1a



D8-2a



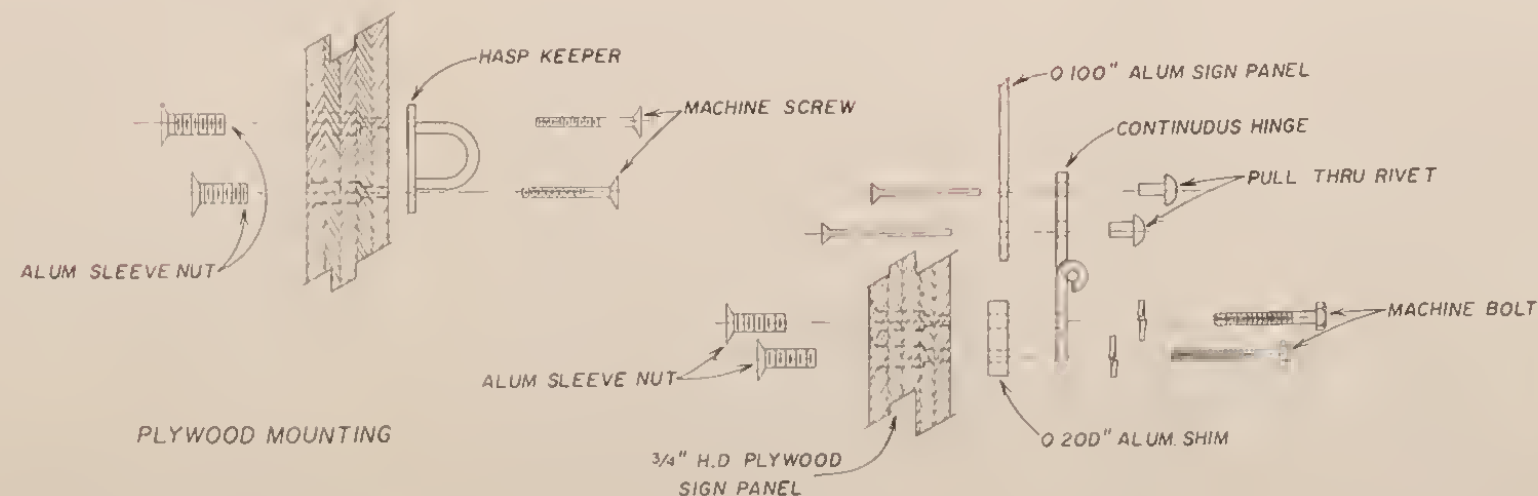
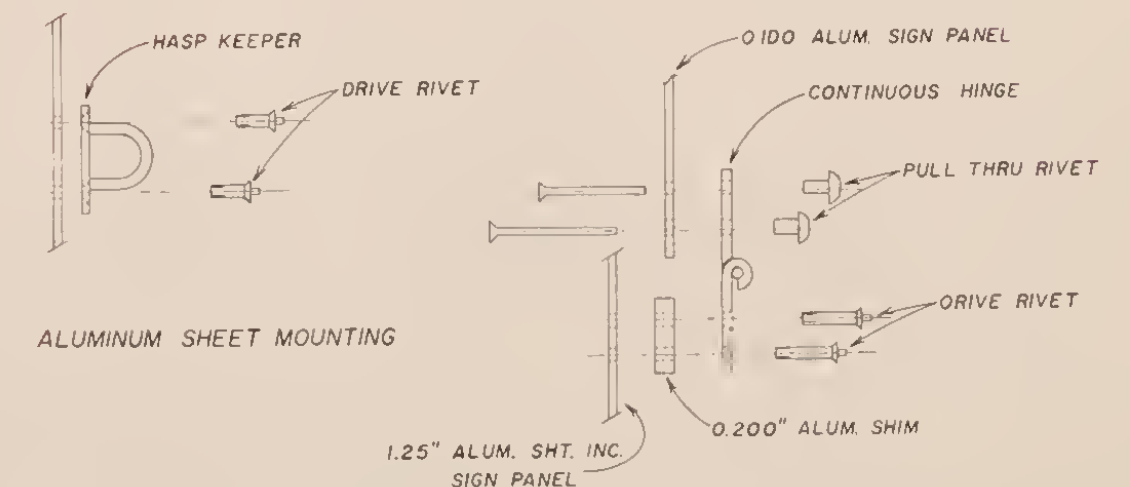
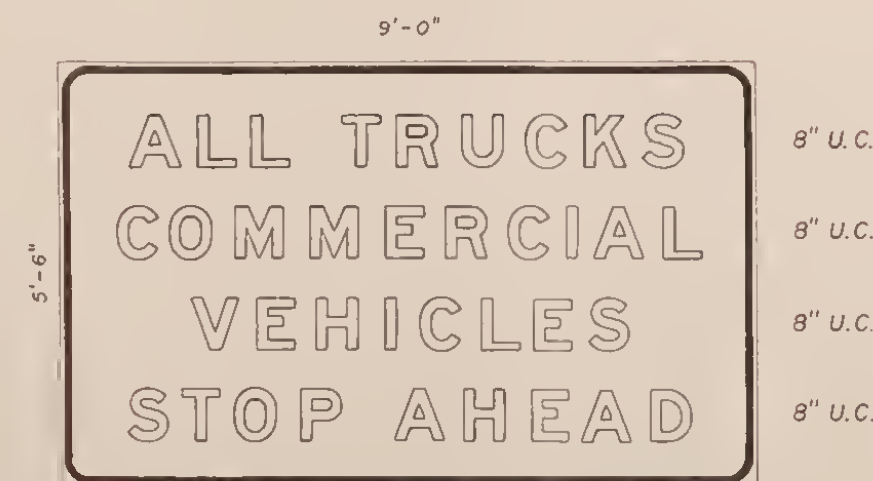
D8-2aP



NOTES:

- 1 D8-1a & D8-2a Signs shall have WHITE REFLECTORIZED legend on a GREEN REFLECTORIZED background.
- 2 R13-1a Sign shall have WHITE REFLECTORIZED legend on a NonreflectORIZED BLACK background.
- 3 The sign panel shall be 3/4" HIGH DENSITY PLYWOOD or .125" ALUMINUM SHEET INCREMENT. The hinged panel shall be .010" SHEET ALUMINUM.
- 4 All hardware visible on the sign face shall be painted the same color as the sign.
- 5 Shop drawings shall be submitted and approved prior to fabrication.
- 6 D8-1a may have variable distance legend.
- 7 All legend shall have SERIES "E" MODIFIED letters.
- 8 Open-Closed sign panel below D8-2a shall have WHITE REFLECTORIZED legend on a BLACK background. (D8-2aP)

R13-1a

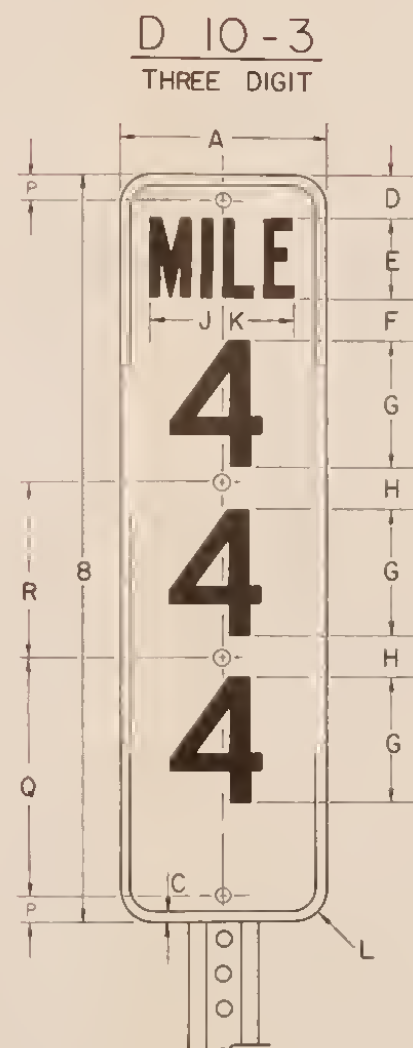
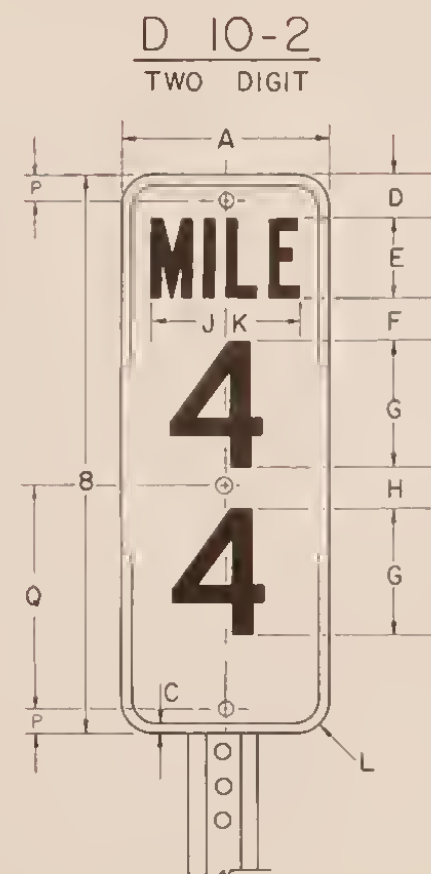
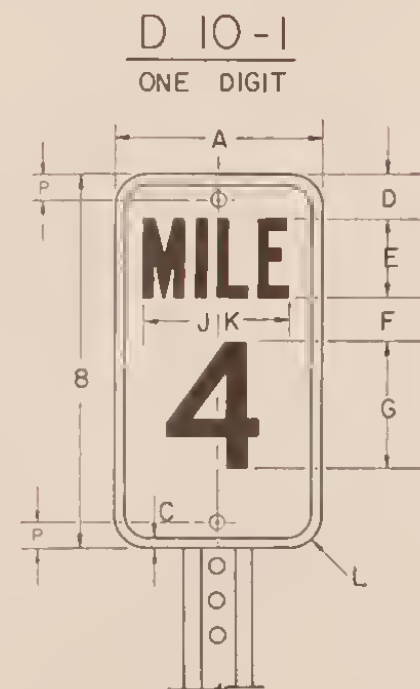


APPROVED: H. J. ANDERSON - DIRECTOR OF HIGHWAYS
BY: *Jack R. B. B.*
ADMINISTRATOR - ENGINEERING DIVISION

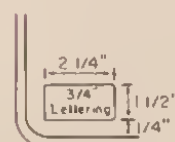
SIGNING
STANDARD DRAWING NO. 237

STATE OF MONTANA
DEPARTMENT OF HIGHWAYS
WEIGH STATION SIGN DESIGN
DETAILS FOR PRIMARY HIGHWAYS

DRAWN BY: 3-3D-73 G. E. G.
CHECKED BY: 3-30-73 G. A. J.



P001	PRIMARY
S201	SECONDARY
I015	INTERSTATE



NOTES

- IN CASE OF A NEW SIGNING PROJECT THE CONTRACTOR SHALL PLACE ROUTE NUMBER IDENTIFICATION STICKERS UPON ALL SIGNS BEFORE FINAL ACCEPTANCE OF THE PROJECT THE COST FOR THE LABOR TO ACCOMPLISH THIS WORK SHALL BE INCLUDED IN THE SHEET ALUMINUM & OR ALUMINUM SHEET INCREMENT ITEMS OF THE CONTRACT
- THE STICKER SHALL DISPLAY THE FEDERAL AID ROUTE NUMBER & SHALL BE PLACED IN THE LOWER LEFT CORNER OF THE MILEPOST SIGN, NEAREST THE EDGE OF ROADWAY
- THE STICKERS SHALL BE AVAILABLE IN THE DIVISION MAINTENANCE OFFICES THE STICKERS ARE MADE AND CAN BE ORDERED FROM THE DEPARTMENTS SIGN SHOP IN HELENA

MILEPOST PANEL DIMENSION INFORMATION

INTERSTATE			
KEY	1-DIGIT	2-DIGIT	3-DIGIT
A	12.0	12.0	12.0
B	24.0	36.0	48.0
C	0.5	0.5	0.5
D	3.0	3.0	3.0
E	4.0	4.0	4.0
F	3.0	3.0	3.0
G*	10.0	10.0	10.0
H	-	3.0	2.5
J	4.6	4.6	4.6
K	4.8	4.8	4.8
L	1.5R	1.5R	1.5R
P	2.0	2.0	2.0
Q	-	13.0	12.0
R	-	-	13.0

PRIMARY & SECONDARY			
KEY	1-DIGIT	2-DIGIT	3-DIGIT
A	10.0	10.0	10.0
B	18.0	27.0	36.0
C	0.5	0.5	0.5
D	2.0	2.0	2.0
E	4.8	4.8	4.8
F	2.0	2.0	2.0
G*	6.0	6.0	6.0
H	-	3.0	3.0
J	3.6	3.6	3.6
K	3.8	3.8	3.8
L	1.5R	1.5R	1.5R
P	1.5	1.5	1.5
Q	-	10.0	10.0
R	-	-	9.0

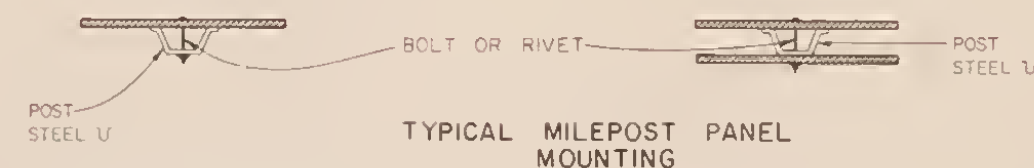
* DIGITS SHOULD BE OPTICALLY CENTERED ON VERTICAL C OF MILEPOST PANEL.

ABOVE VALUES ARE IN INCHES

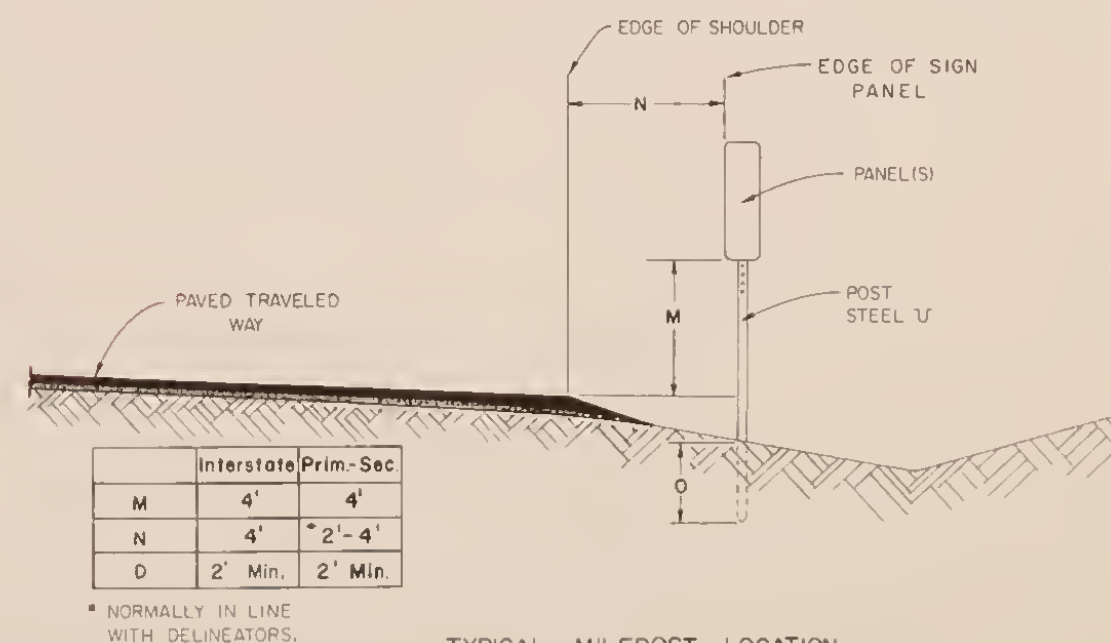
DRAWN BY	3-30-73	G. E. G.
CHECKED BY	3-30-73	C. A. I.

SINGLE PANEL

DOUBLE PANEL



- 1/4" BOLT, NUT AND WASHER SHALL BE GALVANIZED OR CADMIUM PLATED (Jam threads after tightening).
 1/4" RIVETS SHALL BE ALUMINUM OR CADMIUM PLATED.
 PAINT BOLT HEADS OR RIVET HEADS WITH BRILLIANT GREEN SIGN ENAMEL
 DIO-1 use two (2) bolts or rivets.
 DIO-2 use three (3) bolts or rivets.
 DIO-3 use four (4) bolts or rivets.



TYPICAL MILEPOST LOCATION

	Interstate	Prim.-Sec.
M	4'	4'
N	4'	* 2'-4'
D	2' Min.	2' Min.

* NORMALLY IN LINE WITH DELINEATORS.

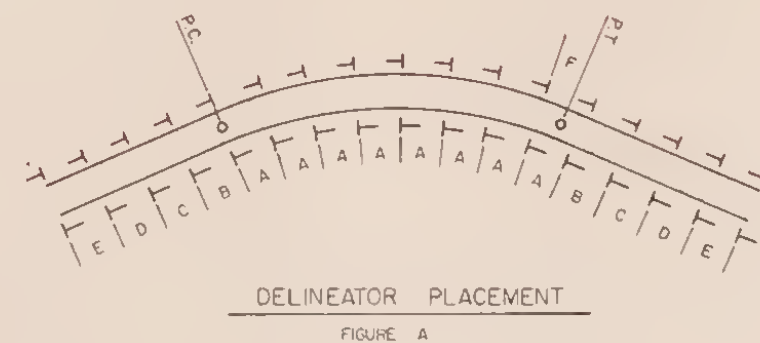
NOTES

- MILEPOST PANEL SHALL HAVE A REFLECTIVE WHITE LEGEND AND BORDER ON A REFLECTIVE GREEN BACKGROUND MOUNTED ON A STEEL U POST.
- SECTION 2D-47 OF THE 1971 FHWA M.U.T.C.D. SHALL GOVERN ALL MILEPOST APPLICATIONS.
- ONCE A MILEPOST HAS BEEN PROPERLY LOCATED AND SET, AT NO TIME SHALL IT BE MOVED FROM THAT LOCATION, EXCEPT WHERE A TRAFFIC ENGINEERING INVESTIGATION REQUIRES ITS RESETTING.
- ALL MILEPOSTS SHALL BE MOUNTED ON A 2 LB/FT MIN. STEEL U POST, EXCEPT THE INTERSTATE DIO-3. THE INTERSTATE DIO-3 SHALL BE MOUNTED ON A 3 LB/FT MIN. STEEL U POST. THIS WILL BE NOTED IN THE SIGNING PLANS.

APPROVED: H. J. ANDERSON - DIRECTOR OF HIGHWAYS
 BY: *[Signature]*
 ADMINISTRATOR - ENGINEERING DIVISION

SIGNING
 STANDARD DRAWING NO. 241

STATE OF MONTANA
 DEPARTMENT OF HIGHWAYS
 MILEPOST DETAILS



Position delineator faces perpendicular to tangent to center line of curve as shown right. Spacing shall be as shown in Table I.

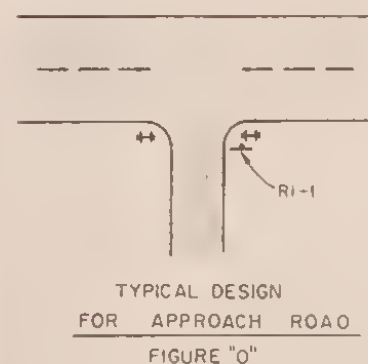
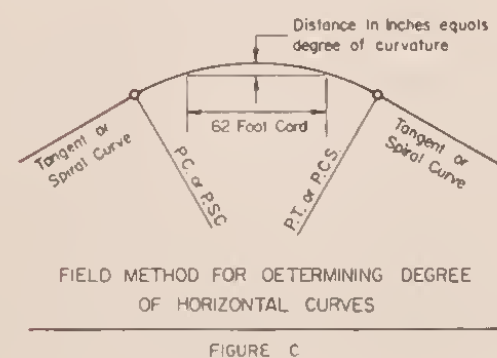
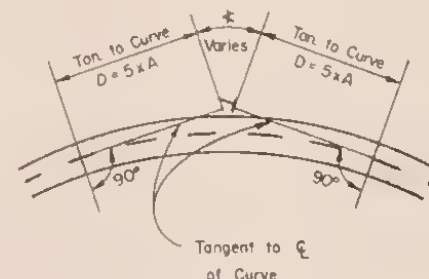


TABLE I

HORIZONTAL CURVE SPACING TABLE					
DEGREE OF CURVE	SPACING A ON CURVE	SPACING ON BOTH TANGENTS			
		B	C	D	E
0° TO 30'	300'	300'	300'	300'	300'
30' TO 1°	300'	300'	300'	300'	300'
1° TO 2°	250'	300'	300'	300'	300'
2° TO 3°	175'	300'	300'	300'	300'
3° TO 4°	120'	240'	300'	300'	300'
4° TO 6°	90'	180'	270'	300'	300'
6° TO 8°	85'	170'	255'	300'	300'
8° TO 12°	75'	150'	225'	300'	300'
12° TO 20°	60'	120'	180'	300'	300'
20° PLUS	40'	80'	120'	240'	300'

(SEE FIGURE A ABOVE FOR SPACING DIAGRAM)

1. ALL DELINEATORS SHALL BE OF THE DESIGN SHOWN ON THIS SHEET. REFLECTIVE SHEETING SHALL BE FURNISHED ACCORDING TO STANDARD SPECIFICATIONS FOR ENCAPSULATED LENS, WIDE ANGLE.

2. DELINEATORS SHALL BE MOUNTED ON STEEL "U" POSTS OF THE TYPE SHOWN FOR DESIGN "A" DELINEATOR. THE DELINEATORS MAY HAVE ROUND OR SQUARE MOUNTING HOLES. IF SQUARE HOLES ARE USED, A LARGE HEADED RIVET OR BOLT, OR AN APPROPRIATE WASHER, MUST BE USED, WHERE BOLTS ARE USED, THE THREADS MUST BE JAMMED AFTER TIGHTNING THE NUT TO PREVENT REMOVAL.

3. DELINEATORS SHALL BE PLACED AT A CONSTANT DISTANCE FROM THE EDGE OF THE ROADWAY EXCEPT WHERE A GUARDRAIL OR OTHER OBSTRUCTION INTERFERES DELINEATORS SHALL THEN BE IN LINE WITH THE INSIDE EDGE OF THE OBSTRUCTION OR BEHIND GUARDRAIL. NORMAL PLACEMENT SHALL BE TO THE RIGHT OF THE ROADWAY FACING ONCOMING TRAFFIC CLEARANCE FOR DELINEATORS SHALL BE 4'-0" ON INTERSTATE HIGHWAYS, 2'-0" TO 4'-0" ON PRIMARY AND SECONDARY HIGHWAYS. STANDARD MOUNTING HEIGHT SHALL BE 4'-0".

4. DELINEATORS SHALL BE SPACED ACCORDING TO THE DISTANCES FOUND IN TABLE I. IF DELINEATORS ARE TO BE SPACED DIFFERENTLY, IT WILL BE NOTED IN THE PLANS AS TO THEIR PLACEMENT. IF, IN FIGURE A, "F" DISTANCE IS GREATER THAN 20 FEET, ADD ONE REGULAR DELINEATOR IN AT "A" DISTANCE SPACING. WHERE, UNDER NORMAL SPACING, A DELINEATOR SHOULD FALL WITHIN A CROSSROAD OR AN APPROACH, THAT DELINEATOR MAY BE MOVED IN EITHER DIRECTION A DISTANCE NOT TO EXCEED ONE QUARTER OF THE NORMAL SPACING. DELINEATORS STILL FALLING WITHIN SUCH AREAS SHOULD BE ELIMINATED. (SEE FIGURES A, B, AND D.)

5. FOR PLANS SHOWING CONTINUOUS DELINEATION OF A ROADWAY, DESIGN "A" DELINEATORS SHALL BE EQUALLY SPACED 300 FEET APART, UNLESS DIFFERENTLY NOTED IN THE PLANS AS TO SPACING AND PLACEMENT. CURVE SECTIONS SHALL FOLLOW SPACINGS LISTED IN TABLE I, AND AS SHOWN IN FIGURE A.

6. FIGURE C SHOWS THE FIELD METHOD FOR DETERMINING THE DEGREE OF A CURVE FOR PLACEMENT AND SPACING OF DELINEATORS WHEN PERTINENT INFORMATION CONCERNING THAT CURVE IS NOT OBTAINABLE.

7. TABLE II SHOWS THE PROPER SYMBOLS FOR THE VARIOUS DESIGN DELINEATORS, AND SHALL BE NOTED AS SUCH THROUGHOUT THE PLANS FOR PROPER DELINEATOR APPLICATION.

8. IF DELINEATION IS CONSIDERED NECESSARY TO DELINEATE AN APPROACH WITH OR WITHOUT AN RI-1 IT SHALL BE OF THIS TYPICAL DESIGN. (SEE FIGURE "D")

9. DELINEATOR POST LENGTHS SHALL BE 6'-6" FOR INTERSTATE HIGHWAYS, 6'-0" FOR PRIMARY AND SECONDARY HIGHWAYS.

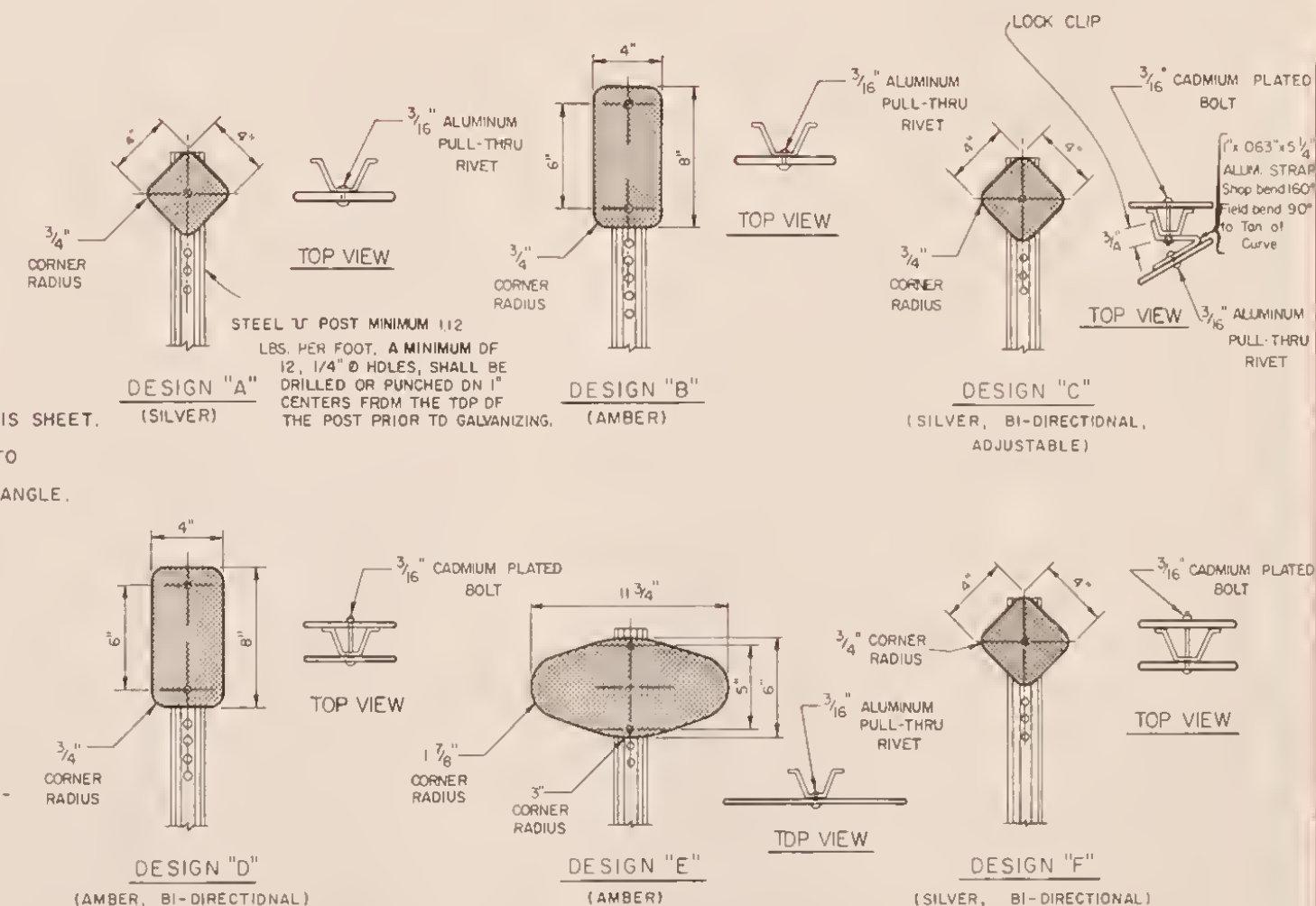


TABLE II

DELINEATOR	LEGEND
DESIGN "A"	—
DESIGN "B"	—
DESIGN "C"	—
DESIGN "D"	—
DESIGN "E"	—
DESIGN "F"	—

TABLE III

PHOTOMETRIC SPECIFICATIONS FOR ENCAPSULATED LENSES AND WIDE ANGLE REFLECTIVE SHEETING DELINEATORS.							
COLOR	SILVER				YELLOW-AMBER		
DIVERGENCE ANGLE	1/3°				1/3°		
INCIDENCE ANGLE	0°	15°	30°	45°	0°	15°	30°
VALUE	450	420	375	100	175	165	90

APPROVED: H. J. ANDERSON - DIRECTOR OF HIGHWAYS
BY: *Jack R. Bellet*
ADMINISTRATOR - ENGINEERING DIVISION

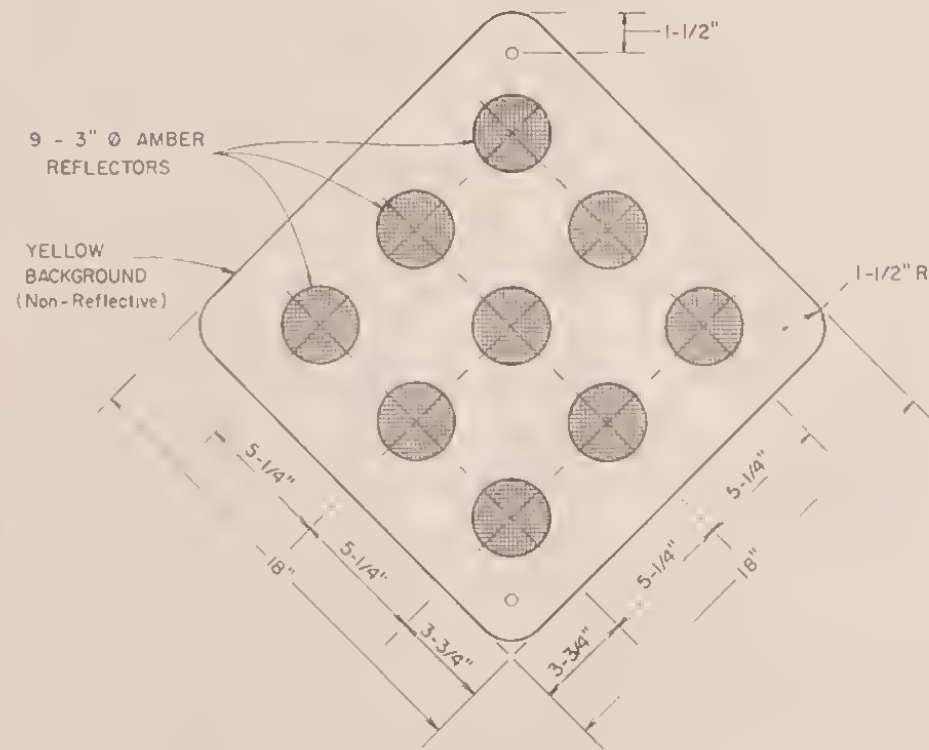
SIGNING
STANDARD DRAWING NO. 242

STATE OF MONTANA
DEPARTMENT OF HIGHWAYS
DELINEATOR DESIGN AND
PLACEMENT DETAILS

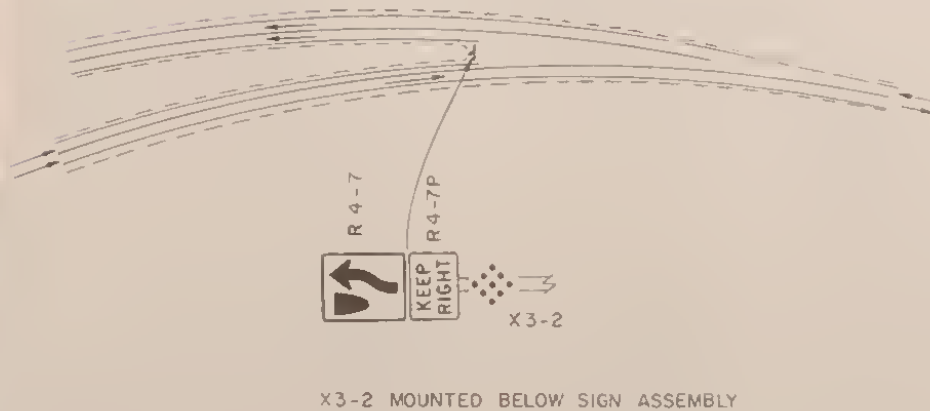
DRAWN BY: 3-30-73 G. E. G.
CHECKED BY: 3-30-73 G. A. J.

TYPE 1

X 3 - 2

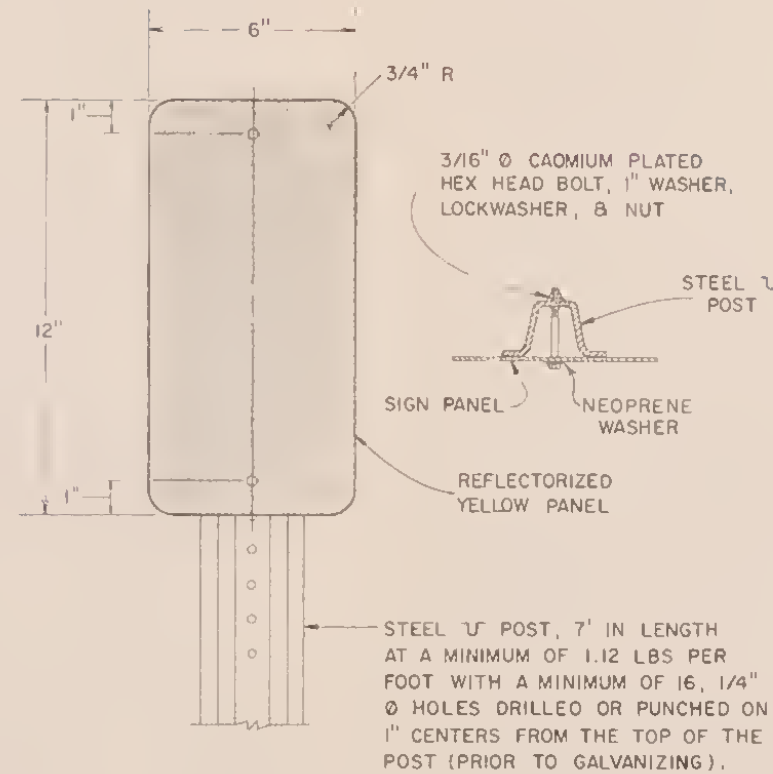


TYPICAL USE AND PLACEMENT

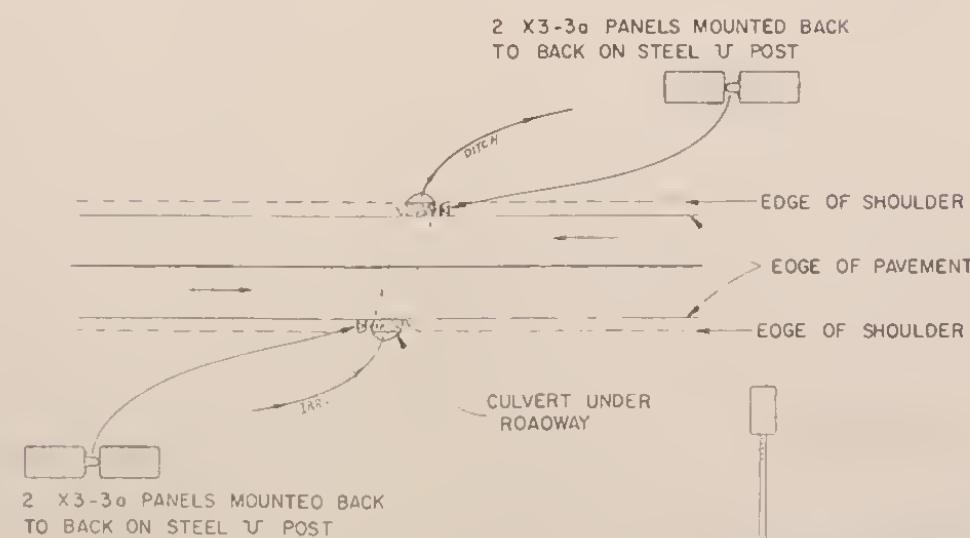


TYPE 2

X 3-3a

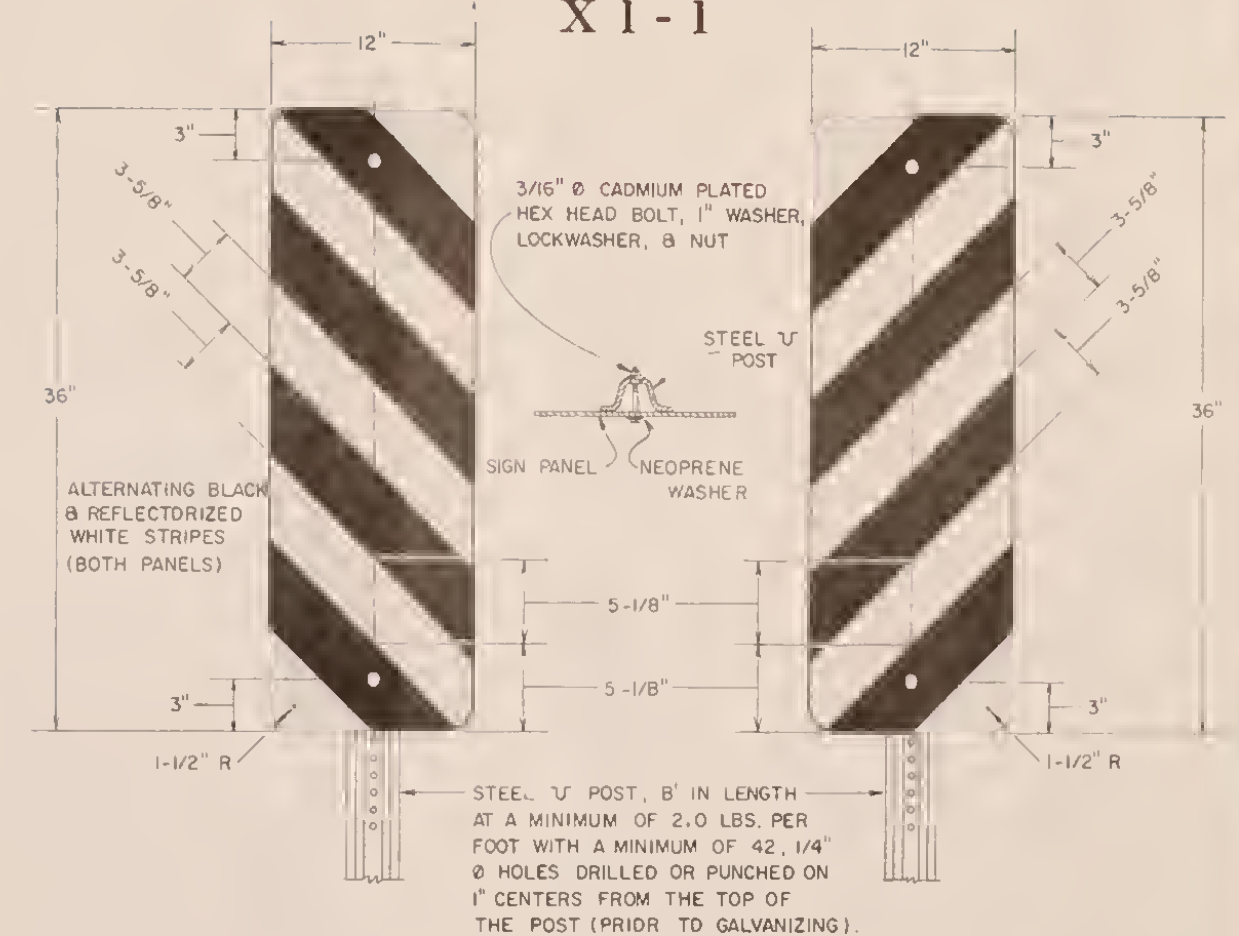


TYPICAL USE AND PLACEMENT

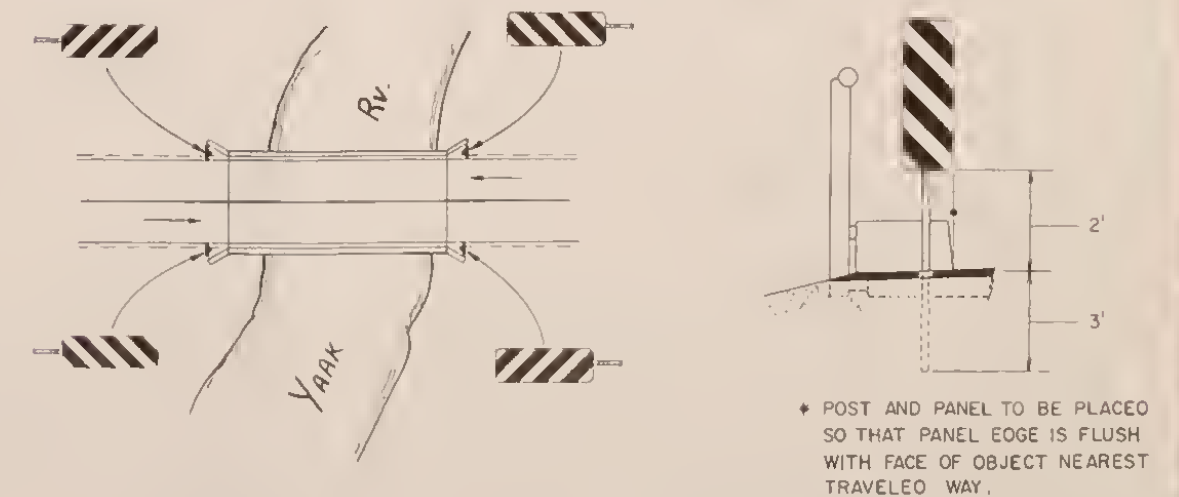


TYPE 3

X 1 - 1



TYPICAL USE AND PLACEMENT



APPROVED H J ANDERSON - DIRECTOR OF HIGHWAYS
BY *W. J. Anderson*
ADMINISTRATOR - ENGINEERING DIVISION

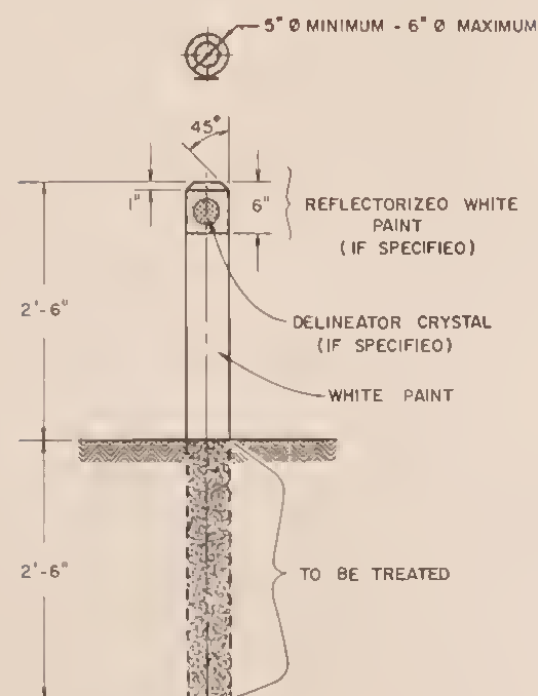
SIGNING
STANDARD DRAWING NO. 243

STATE OF MONTANA
DEPARTMENT OF HIGHWAYS
OBJECT MARKER DESIGN &
PLACEMENT DETAILS FOR OBSTRUCTIONS
ADJACENT TO OR WITHIN HIGHWAYS

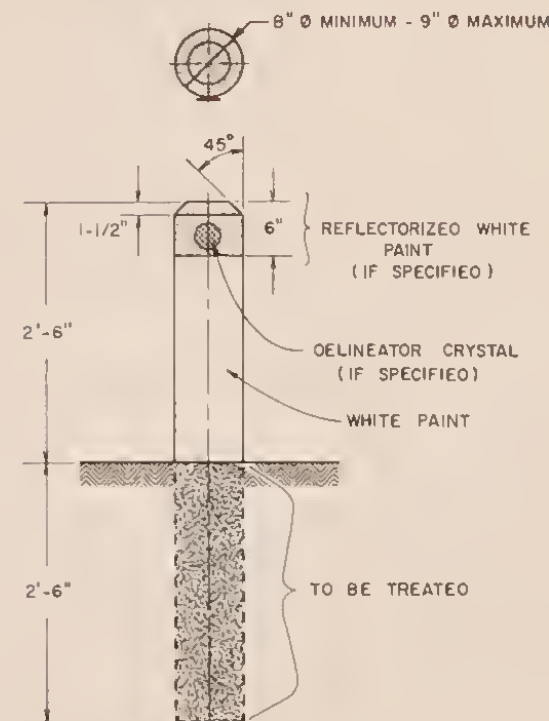
DRAWN BY: 6-6-73 G E G
CHECKED BY: 6-28-73 C. H. L.

POST AND PANEL(S) TO BE PLACED
SO THAT PANEL(S) ARE DIRECTLY
ADJACENT TO INNER MOST EDGE OF
OBJECT NEAREST TRAVELED WAY.

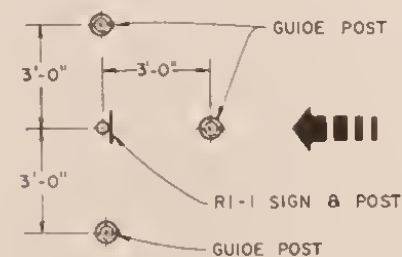
5" DIAMETER WOOD GUIDE POST



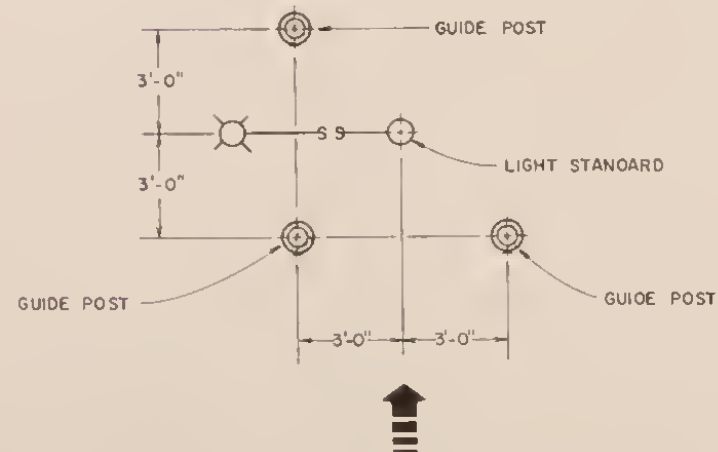
8" DIAMETER WOOD GUIDE POST



TYPICAL USE AND PLACEMENT



TYPICAL USE AND PLACEMENT



NOTES

WOOD GUIDE POSTS

1. WOOD GUIDE POSTS SHALL CONFORM TO THE APPLICABLE PROVISIONS OF THE STANDARD SPECIFICATIONS FOR ROAD & BRIDGE CONSTRUCTION.
2. THE PORTION OF THE WOOD GUIDE POST THAT IS TO BE IN THE GROUND SHALL BE TREATED FOR PROTECTION AS PER THE STANDARD SPECIFICATIONS.
3. THE PORTION OF THE WOOD GUIDE POST THAT IS TO BE ABOVE GROUND SHALL BE PAINTED WITH TWO (2) COATS OF WHITE PAINT AS PER THE STANDARD SPECIFICATIONS.
4. CONTRACTOR HAS CHOICE OF TOP END FINISH FOR WOOD GUIDE POSTS. ALL WOOD GUIDE POSTS FURNISHED ON CONTRACT SHALL HAVE THE SAME TOP END FINISH THROUGHOUT.
5. REFLECTORIZATION OF WOOD GUIDE POSTS, IF REQUIRED IN PLAN SPECIFICATIONS, SHALL BE ACCOMPLISHED BY

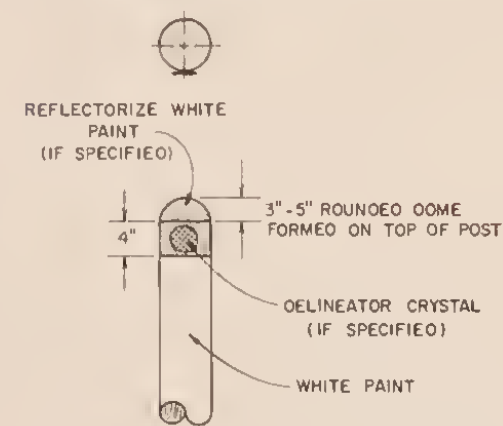
(5 CONT'D) APPLYING WHITE REFLECTORIZED PAINT ON THE TOP 6 INCH PORTION, AND/OR THE INSTALLATION OF DELINEATOR CRYSTALS AS SPECIFIED.

6. THE EXACT TYPE OF WOOD GUIDE POSTS TO BE USED, THEIR LOCATION AND PLACEMENT, SHALL BE FOUND DETAILED IN THE SIGNING PLANS OF THE CONTRACT.

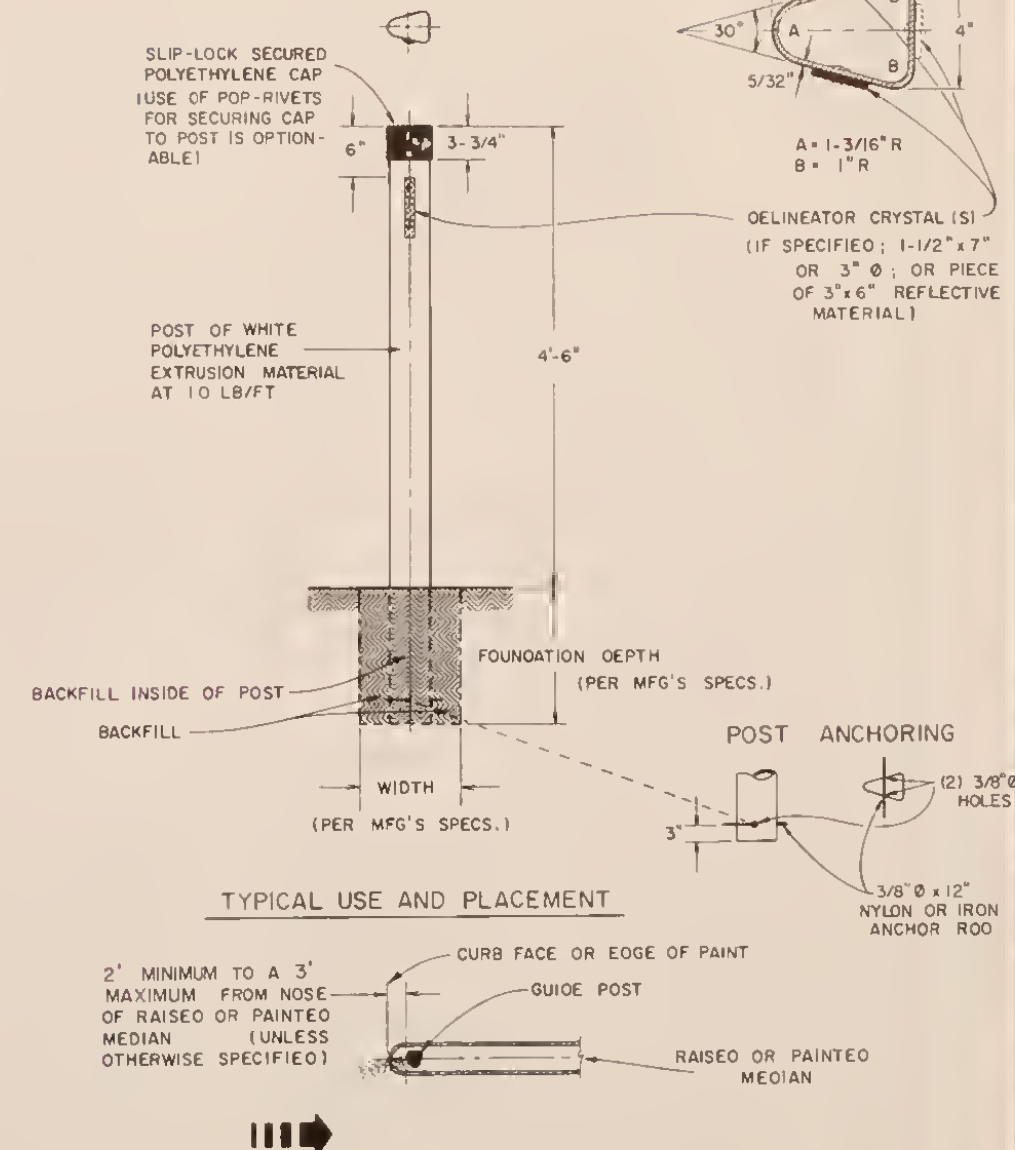
FLEXIBLE GUIDE POSTS

1. FLEXIBLE GUIDE POSTS SHALL CONFORM TO THE DESIGN AND SPECIFICATIONS DETAILED ON THIS SHEET.
2. FLEXIBLE GUIDE POSTS SHALL BE EMBEDDED TO THE MANUFACTURERS' SPECIFIED FOUNDATION DEPTH WITH THEIR SPECIFIED FOUNDATION WIDTH USING THE POST ANCHORING DESIGN AS DETAILED.
3. THE HOLLOW POST PORTION TO BE IN THE GROUND SHALL BE BACKFILLED INSIDE WITH THE SAME MATERIAL AS THE

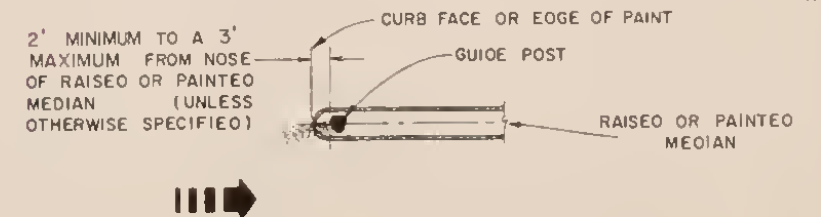
ALTERNATE TOP END FINISH
FOR ROUND WOOD GUIDE POSTS



FLEXIBLE GUIDE POST



TYPICAL USE AND PLACEMENT



- (3 CONT'D) FOUNDATION.

4. REFLECTORIZING OF FLEXIBLE GUIDE POSTS, IF REQUIRED IN PLAN SPECIFICATIONS, SHALL BE ACCOMPLISHED BY THE ADDITION OF DELINEATOR CRYSTALS, EITHER 1-1/2" x 7" OR 3" DIAMETER, OR BY ADDING A 3" x 6" PIECE OF TYPE II REFLECTIVE SHEETING. THE COLOR OF THE DELINEATOR CRYSTALS OR REFLECTORIZED MATERIAL SHALL BE FOUND DETAILED IN THE SIGNING PLANS OF THE CONTRACT.
5. THE EXACT LOCATION AND PLACEMENT OF THE FLEXIBLE GUIDE POSTS SHALL BE FOUND DETAILED IN THE SIGNING PLANS.

 = DIRECTION OF VEHICULAR TRAVEL

APPROVED H. J. ANDERSON - DIRECTOR OF HIGHWAYS
BY Lach R. Roberts
ADMINISTRATOR - ENGINEERING DIVISION

SIGNING
STANDARD DRAWING NO. 244

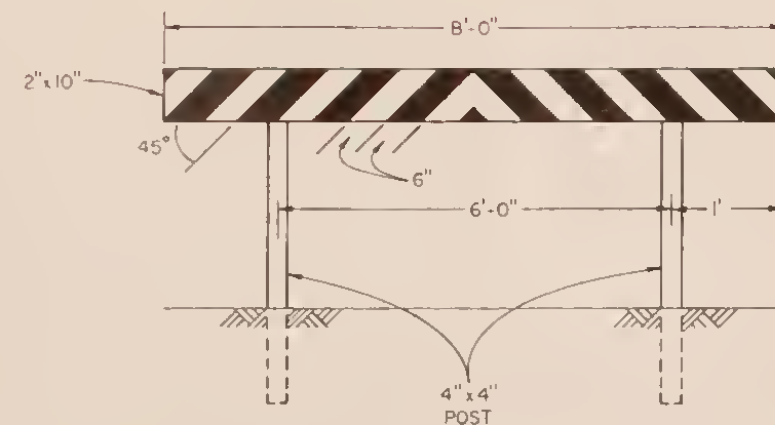
STATE OF MONTANA
DEPARTMENT OF HIGHWAYS
GUIDE POST DESIGN AND
PLACEMENT DETAILS

DRAWN BY:	5-23-73	G. E. G.
CHECKED BY:	6-1-73	C. H. L.

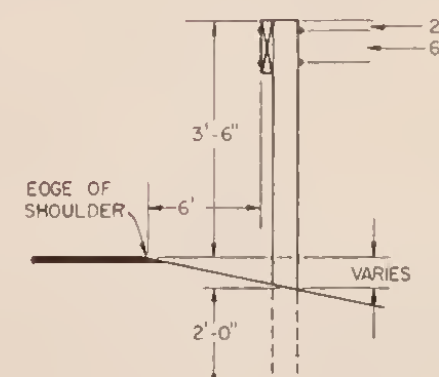
TYPE I-A BARRICADE

NOTES

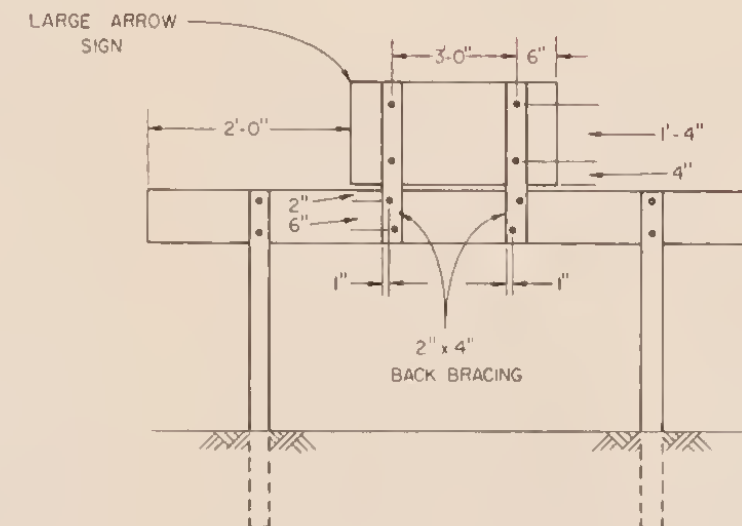
1. ALL BARRICADES SHALL BE CONSTRUCTED OF COMMERCIAL GRADE S4S LUMBER. USE $\frac{3}{8}$ " CARRIAGE OR CADMIUM PLATED BOLTS, WASHERS, AND NUTS FOR ALL CONNECTIONS.
2. ALL BARRICADES SHALL BE PAINTED WITH 2 COATS OF BLACK PAINT IN ACCORDANCE WITH SECTION M-280.02, (2) AND (9) OF THE STANDARD SPECIFICATIONS MANUAL, 1970 EDITION, OF THE DEPARTMENT OF HIGHWAYS - STATE OF MONTANA.
3. ALL BARRICADES SHALL HAVE ALTERNATING REFLECTIVE BLACK AND WHITE STRIPES, 6" IN WIDTH AT AN ANGLE OF 45° WITH THE VERTICAL, STARTING DOWNWARD TOWARD THE SIDE OR SIDES ON WHICH TRAFFIC IS TO FLOW.
4. ALL BARRICADES SHALL BE REFLECTORIZED WITH SILVER SHEETING MOUNTED ON A SHEET ALUMINUM BACKING AT LEAST 0.019" THICK. ALUMINUM ALLOY 6061-T6 CONFORMING TO A S T. M. DESIGNATION B-209 SHALL BE USED. THIS REFLECTIVE ALUMINUM SHEETING SHALL BE SECURED WITH ALUMINUM NAILS.
5. POST LENGTHS SHALL BE DETERMINED IN THE FIELD, TO COMPLY WITH THE MOUNTING HEIGHTS AND FOUNDATION DEPTHS LISTED ON THIS SHEET, DUE TO VARIABLE SLOPES, CUTS, OR FILLS.
6. SECTION 6C-2, 6, AND 7 OF THE FEDERAL HIGHWAY ADMINISTRATION'S M.U.T.C.O., 1971 EDITION, SHALL GOVERN ALL USES OF BARRICADES.
7. THE TYPE I-A OR III-A DESIGNATES THAT THESE BARRICADES ARE TO BE SET IN THE GROUND.



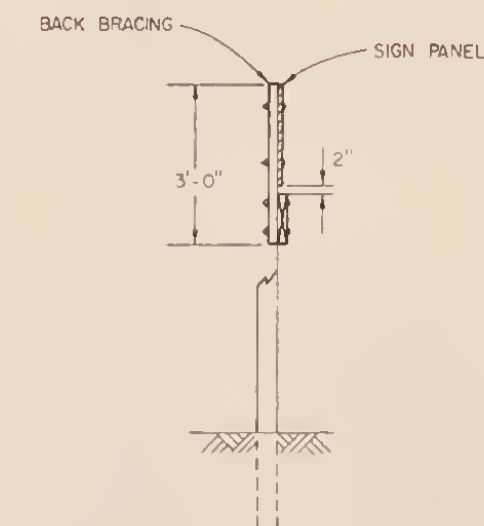
FRONT VIEW



RIGHT END VIEW



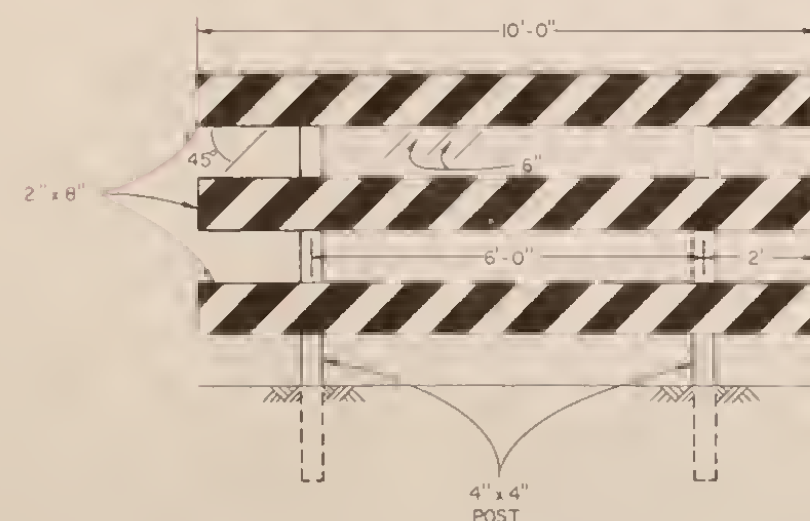
REAR VIEW



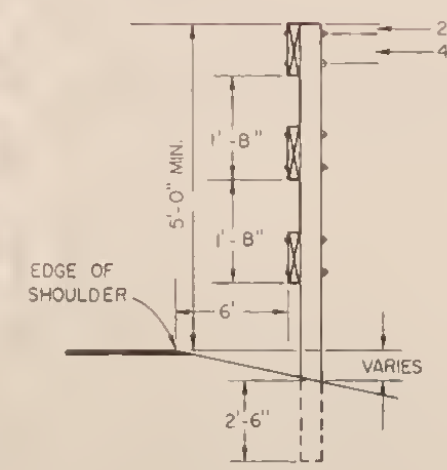
LEFT END VIEW

GENERAL BARRICADE DETAILS

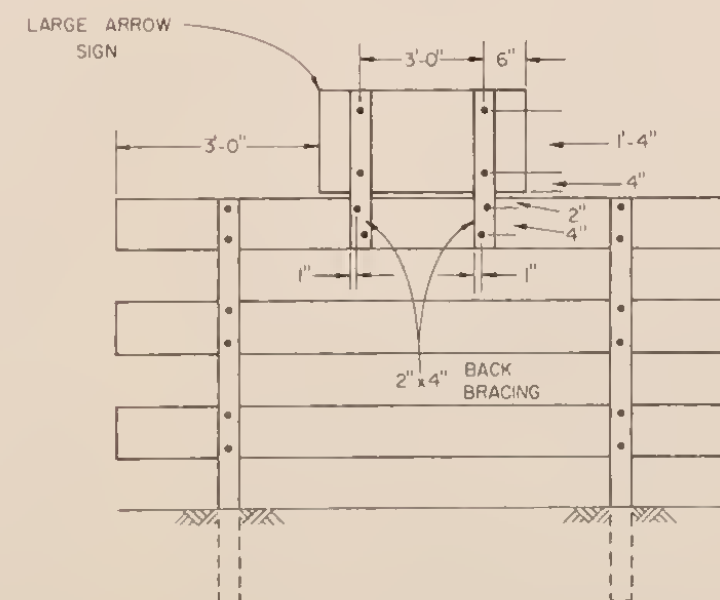
AUXILLARY SIGN MOUNTING DETAILS



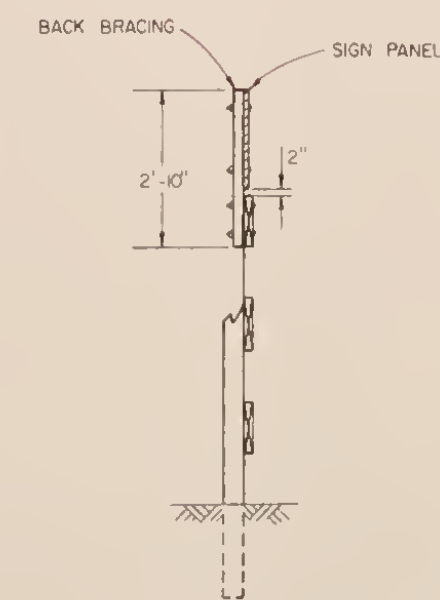
FRONT VIEW



RIGHT END VIEW



REAR VIEW



LEFT END VIEW

GENERAL BARRICADE DETAILS

AUXILLARY SIGN MOUNTING DETAILS

TYPE III-A BARRICADE

DRAWN BY:	3-30-73	G. E. G.
CHECKED BY:	3-30-73	(signature)

APPROVED: H. J. ANDERSON - DIRECTOR OF HIGHWAYS
BY: Jack R. Baker
ADMINISTRATOR - ENGINEERING DIVISION

SIGNING
STANDARD DRAWING NO. 245

STATE OF MONTANA
DEPARTMENT OF HIGHWAYS
PERMANENT TYPE BARRICADE
DESIGN DETAILS

S2-1S



6" UC SERIES "D"

4" UC SERIES "B"

36" x 18" SUPPLEMENTAL TO ALL S2-1's
BLACK on WHITE

IMPORTANT NOTE

INFORMATION CONTAINED HEREIN IS NOT THE LEGAL
AUTHORITY FOR PLACEMENT OF SCHOOL CROSSING CONTROL
DEVICES. THE DECISION TO USE SUCH CONTROL DEVICES
SHOULD BE MADE ON THE BASIS OF A TRAFFIC
ENGINEERING INVESTIGATION.

S1-1S



6" NUMERAL SERIES "E"

6" UC SERIES "C"

36" x 12" SUPPLEMENTAL TO MUNICIPAL &
URBAN S1-1's
BLACK on YELLOW

S1-1S



6" NUMERAL SERIES "C"

B" "X" SERIES "C"

6" UC SERIES "C"

NUMERAL WILL VARY
WITH CROSSINGS
INVOLVED (min. 2 - max 9)

36" x 12" SUPPLEMENTAL TO MUNICIPAL &
URBAN S1-1's
BLACK on YELLOW

S1-1S

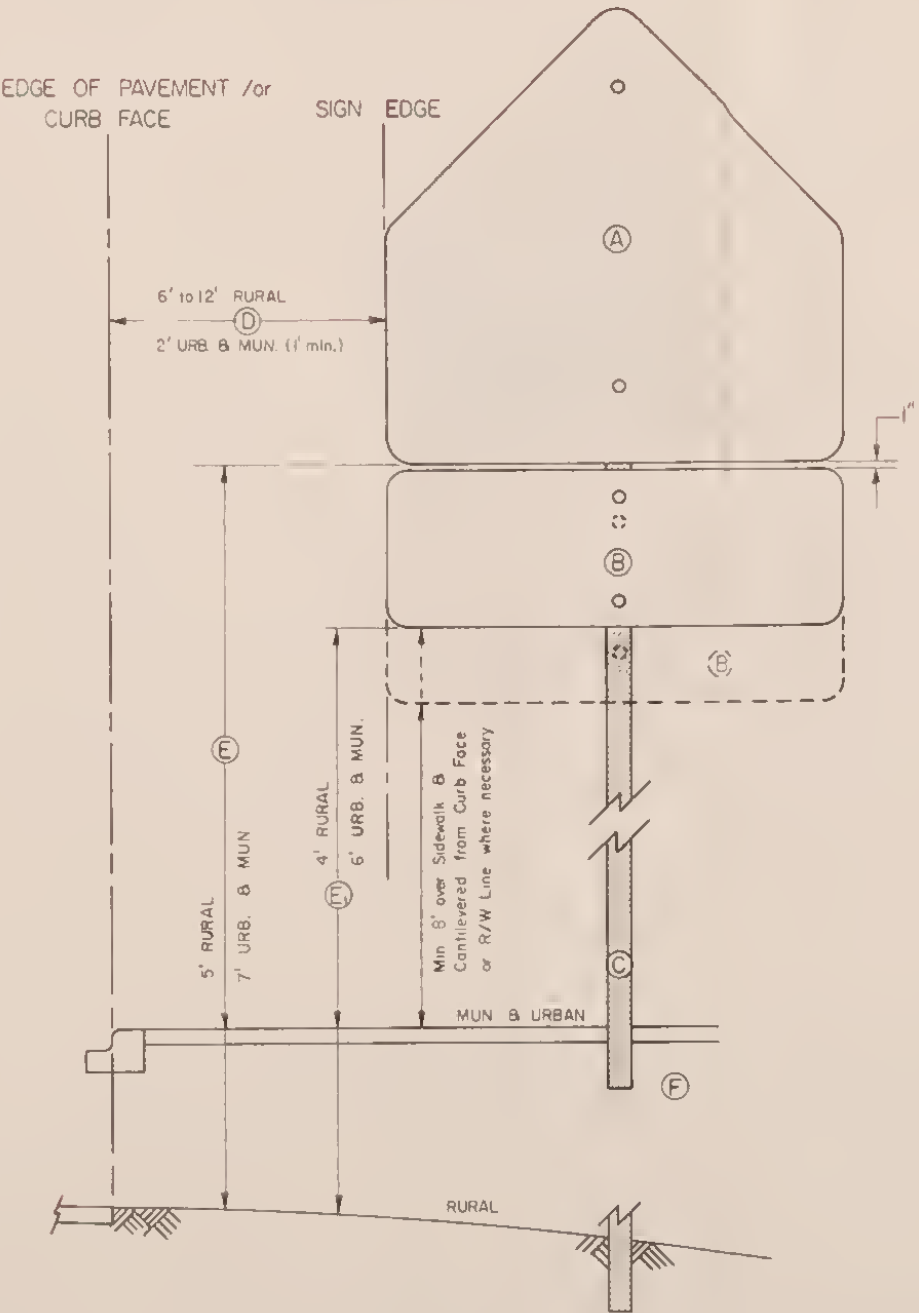


6" NUMERAL SERIES "D"

6" UC SERIES "D"

NUMERAL (FOOTAGE) WILL
VARY WITH LOCAL
CONDITIONS (min 200 FT -
max 900 FT - S1'd 800 FT)

36" x 12" SUPPLEMENTAL TO RURAL S1-1's
BLACK on YELLOW



ELEVATION

LEGEND NOTES

- (A) S1-1 School Advance Sign for S2-1
- (B) School Crossing Sign (Sect 7B-9, 7B-10 of MUTCD)
- (C) S1-1S for S2-1S Supplemental Sign (Sect 7B-1 of MUTCD)
- (D) Posts (Sect 2A-27 of MUTCD)
- (E) Lateral Clearance (Sect 2A-24 of MUTCD)
- (F) Height (Sect 2A-23 of MUTCD)
- (G) " " " " "
- (H) Foundation (M.S.H.C. S1'd Spec's)

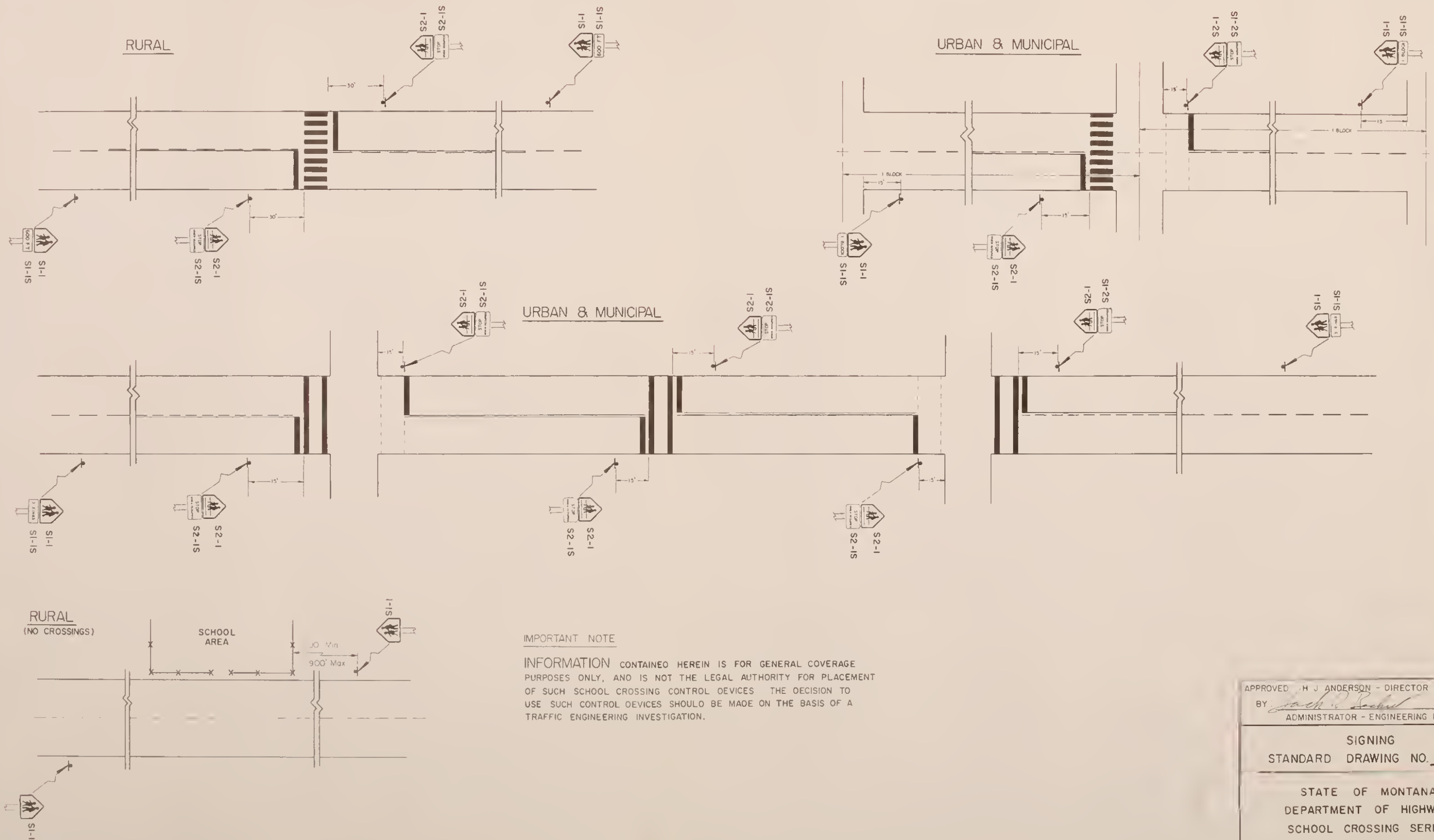
APPROVED H. J. ANDERSON - DIRECTOR OF HIGHWAYS
BY *John R. B. B.*
ADMINISTRATOR - ENGINEERING DIVISION

SIGNING
STANDARD DRAWING NO. 251

STATE OF MONTANA
DEPARTMENT OF HIGHWAYS
SCHOOL CROSSING SERIES
SIGN DESIGN DETAILS

DRAWN BY: 3-30-73 G. E. G
CHECKED BY: 3-30-73 G. A. J

PLACEMENT GUIDELINES



IMPORTANT NOTE

INFORMATION CONTAINED HEREIN IS FOR GENERAL COVERAGE PURPOSES ONLY, AND IS NOT THE LEGAL AUTHORITY FOR PLACEMENT OF SUCH SCHOOL CROSSING CONTROL DEVICES. THE DECISION TO USE SUCH CONTROL DEVICES SHOULD BE MADE ON THE BASIS OF A TRAFFIC ENGINEERING INVESTIGATION.

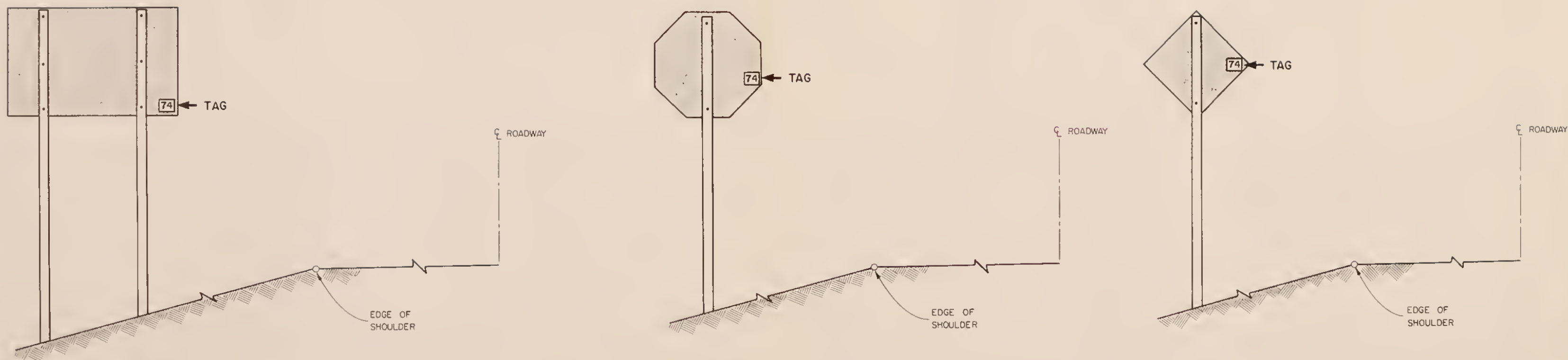
APPROVED: H. J. ANDERSON - DIRECTOR OF HIGHWAYS
 BY: *Jack P. Roberts*
 ADMINISTRATOR - ENGINEERING DIVISION

SIGNING
 STANDARD DRAWING NO. 252

STATE OF MONTANA
 DEPARTMENT OF HIGHWAYS
 SCHOOL CROSSING SERIES
 SIGNING & PLACEMENT DETAILS

DRAWN BY:	3-30-73	G. E. G.
CHECKED BY:	3-30-73	

— INSTALLATION DATE TAGS — PLACEMENT DETAILS



NOTES:

1. In the case of a new Signing Project, the contractor shall place Installation Date Tags upon all signs before final acceptance of the Project. The cost for the labor to accomplish this work shall be included in the Sheet Aluminum and/or Aluminum Sheet Increment Items of the Contract.
2. Tags shall also be placed upon any new sign which is installed in the field as routine maintenance.
3. The Tag shall display the year in which the sign was installed. The color for each year's Tag shall be assigned at the beginning of the year by the Department of Highways Sign Shop in Helena, in order to make it easier to recognize the year of installation from the roadway.
4. The Tag shall be placed upon the back of each sign, located near the lower corner of the sign nearest the edge of roadway, and shall be visible from the roadway as shown in the examples (e.g.) above.
5. The Tags shall be available in the Divisions, either at the Division Maintenance Offices or the Division Construction Office. The Tags are made and can be ordered from the Department's Sign Shop in Helena.

APPROVED: H. J. ANDERSON - DIRECTOR OF HIGHWAYS
BY: *John D. Bickert*
ADMINISTRATOR - ENGINEERING DIVISION

SIGNING
STANDARD DRAWING NO. 256

STATE OF MONTANA
DEPARTMENT OF HIGHWAYS
INSTALLATION DATE TAGS
PLACEMENT DETAILS

DRAWN BY:	3-30-73	G. E. G.
CHECKED BY:	3-30-73	GAJ

